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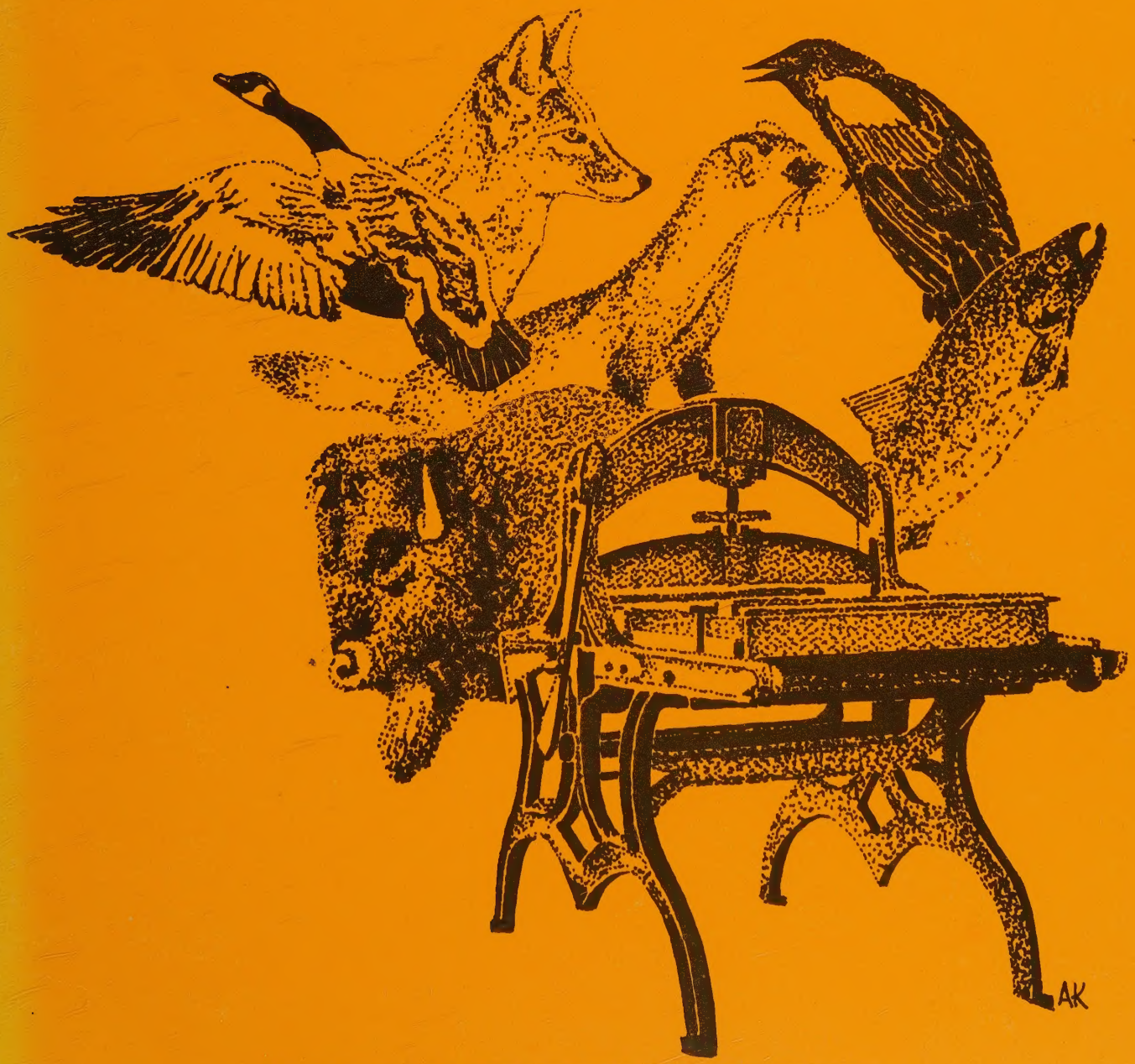
Selected Research Publication Series of the U.S. Fish and Wildlife Service 1889–1985



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE / *RESOURCE PUBLICATION* 159

Resource Publication

This publication of the Fish and Wildlife Service is one of a series of semitechnical or instructional materials dealing with investigations related to wildlife and fish. Each is published as a separate paper. The Service distributes a limited number of these reports for the use of Federal and State agencies and cooperators.

Copies of this publication may be obtained from the Publications Unit, U.S. Fish and Wildlife Service, Matomic Building, Room 148, Washington, DC 20240, or may be purchased from the Government Printing Office, Superintendent of Documents, Washington, DC 20402, and the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161.

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Selected Research Publication Series of the U.S. Fish and Wildlife Service, 1889–1985

Compiled by Thomas J. Cortese
Barbara A. Groshek

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UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Resource Publication 159
Washington, DC • 1987

Preface

This bibliography provides a detailed record of publications in 10 selected Research and Development series produced by the U.S. Fish and Wildlife Service and its predecessor agencies in the Department of the Interior or the Department of Agriculture. Some of the series, published before the establishment of the Service, are primarily of historical interest. The more than 2,000 citations referenced demonstrate the variety, scope, and depth of research undertaken by the Service, and reflect the changing emphases in fish and wildlife research since 1889—from husbandry and predator control to sophisticated applications of new technologies.

The annotated list of publications in each series is preceeded by a short introduction that includes a brief history of the series. Listings are complete through December 1985, after which some series titles were changed. Author, species, and subject indexes are provided under a separate cover.

Thomas J. Cortese
Barbara A. Groshek

Acknowledgments

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Selected Research Publication Series of the U.S. Fish and Wildlife Service, 1889–1985

compiled by

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Abstract

This bibliography includes annotated citations for 2,037 scientific and technical publications from 10 selected series issued by the U.S. Fish and Wildlife Service. Included are a history of the evolution of the Service, information on publication availability, description of the series, and addresses of Research and Development facilities. Indexes to authors, species, and subjects are provided under a separate cover.

History of the U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service is the principal agency through which the Federal Government carries out its responsibilities to conserve, protect, and enhance the Nation's fish and wildlife and their habitats for the continuing benefit of the people. Specifically, the Service manages migratory birds, endangered species, certain marine mammals, and freshwater and anadromous fishes.

The Service's origin can be traced back to the creation of the U.S. Commission on Fish and Fisheries in 1871 and the Office of Economic Ornithology, Division of Entomology, Department of Agriculture in 1885 (Fig. 1). The U.S. Commission on Fish and Fisheries was established to study the decrease of the Nation's food fishes and to recommend ways of reversing the decline. It was transferred to the Department of Commerce in 1903 and renamed the Bureau of Fisheries. The Division of Economic Ornithology and Mammalogy was established primarily to study the food habits, distribution, and migration of birds and mammals—especially those that had an impact on agriculture. The Division gradually accumulated responsibilities and underwent several name changes before it was renamed the Bureau of Biological Survey in 1905. In addition to studying the abundance, distribution, and habitats of birds and mammals, the Survey managed the Nation's first wildlife refuges, controlled predators, enforced wildlife laws, and conserved dwindling populations of ducks, and geese, and other migratory birds.

The Bureau of Fisheries of the Department of Commerce and the Bureau of Biological Survey of the Department of Agriculture were transferred to the Department of the Interior in 1939; the two

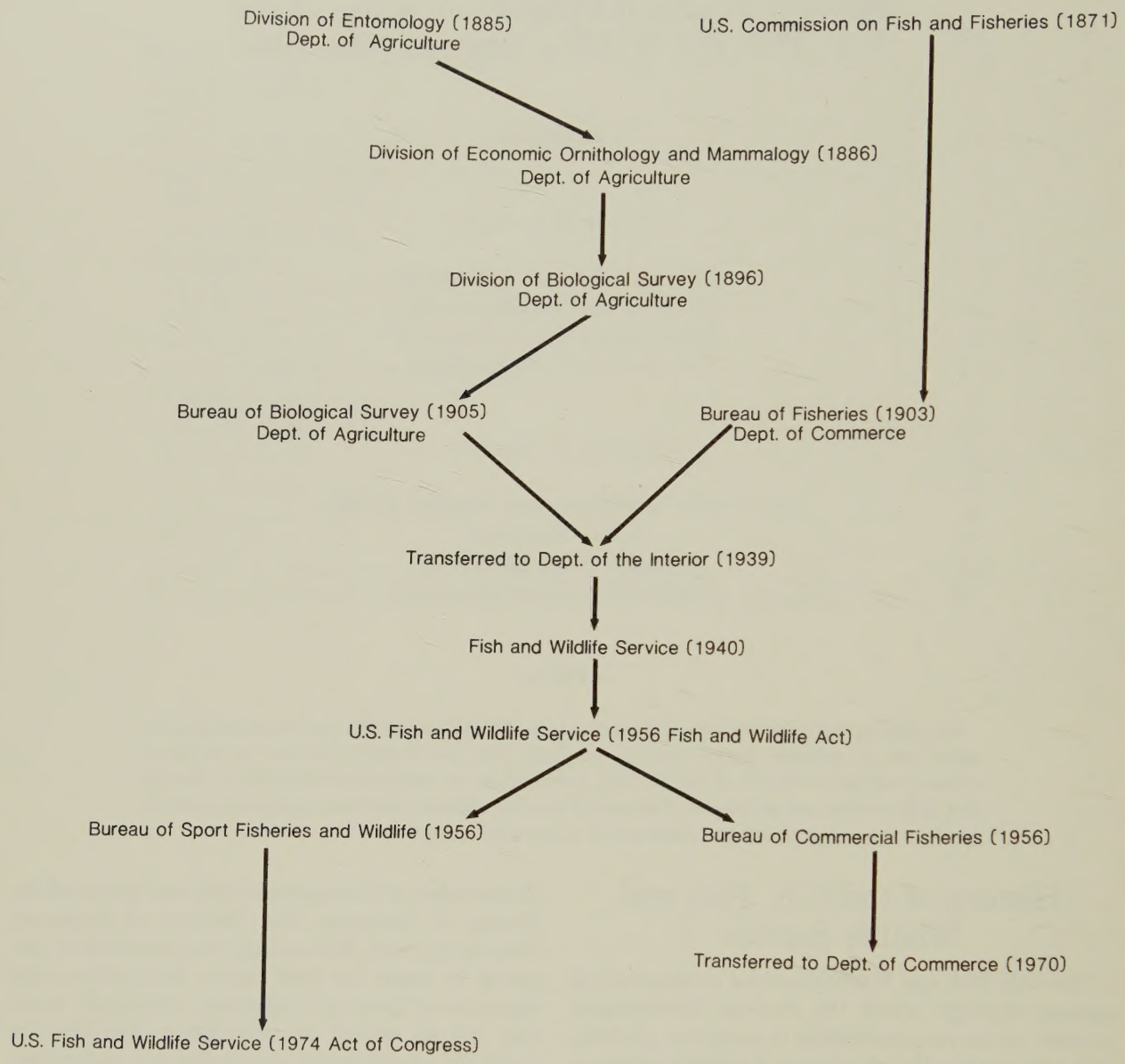
Division of Entomology (1885)
Dept. of Agriculture
U.S. Commission on Fish and Fisheries (1871)
Division of Economic Ornithology and Mammalogy (1886)
Dept. of Agriculture
Division of Biological Survey (1896)
Dept. of Agriculture
Bureau of Biological Survey (1905)
Dept. of Agriculture
Bureau of Fisheries (1903)
Dept. of Commerce
Transferred to Dept. of the Interior (1939)
Fish and Wildlife Service (1940)
U.S. Fish and Wildlife Service (1956 Fish and Wildlife Act)
Bureau of Sport Fisheries and Wildlife (1956)
Bureau of Commercial Fisheries (1956)
Transferred to Dept. of Commerce (1970)
U.S. Fish and Wildlife Service (1974 Act of Congress)

Fig. 1. History of the U.S. Fish and Wildlife Service. (Adapted from W.J. Chandler. 1985. The U.S. Fish and Wildlife Service. Audubon Wildlife Report 1985. The National Audubon Society, New York.)

bureaus were combined and named the Fish and Wildlife Service in 1940. Further reorganization came in 1956 when the Fish and Wildlife Act created the U.S. Fish and Wildlife Service. The conflict between sport and commercial fishing led to compromise legislation that divided the U.S. Fish and Wildlife Service into two bureaus—Commercial Fisheries and Sport Fisheries and Wildlife. The Bureau of Commercial Fisheries was transferred to the Department of Commerce in 1970 to put all marine fishery activities—commercial and sport—into one agency. The Bureau of Sport Fisheries and Wildlife remained in the Department of the Interior. In accordance with the 1974 Act of Congress, the agency retained the earlier name, U.S. Fish and Wildlife Service.

In 1987, The Service consisted of a headquarters office in Washington, D.C., 8 regional offices, 13 major research centers, more than 40 cooperative research units, a variety of field offices, other installations that included national wildlife refuges and National Fish Hatcheries, and a nationwide law enforcement network.

Research and Development Series

Many of the publications listed are out of print; others may be available only in limited quantities. (In 1985, two pairs of series publications were combined and the names of two others were changed, as shown in Table 1; a description of the series as arranged in 1985 is shown in Table 2.)

Series Titles

North American Fauna
Special Scientific Report—Wildlife
Technical Paper
Research Report
Wildlife Research Report
Wildlife Leaflet
Resource Publication
Investigations in Fish Control
Fish Disease Leaflet
FWS/OBS

Availability of Publications

Many of the publications cited in this bibliography are out of print. Copies of most are available on loan from any of the Federal Government Regional Depository Libraries listed in Appendix B (p. 161), and from other Federal Government Depository Libraries throughout the United States. For more information contact:

U.S. Government Printing Office
Library Program Services (SLLA)
Jackson Alley, Room A-150
Washington, DC 20401
(202) 275-1040 or FTS 275-1040

Copies of certain publications listed here are available for purchase (photocopies or microform) from the National Technical Information Service: *FWS/OBS* beginning with 76/01.1; *Resource Publication* beginning with number 152; and all Research and Development series publications, except *Investigations in Fish Control* and *Fish Disease Leaflet*, beginning in 1984. For information contact:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650 or FTS 737-4650

The following Research Centers have limited supplies of the series indicated for free distribution:

Investigations in Fish Control: U.S. Fish and Wildlife Service, National Fisheries Research Center, Office of Technical Information, P.O. Box 818, LaCrosse, WI 54601. (608) 783-6451.

Fish Disease Leaflet: U.S. Fish and Wildlife Service, National Fisheries Center–Leetown, Technical Information Service, Box 700, Kearneysville, WV 25430. (304) 725-8461 or FTS 925-5211.

FWS/OBS: U.S. Fish and Wildlife Service, Office of Information Transfer, Research and Development Publications Management Coordinator, 1025 Pennock Place, Suite 212, Fort Collins, CO 80524. (303) 493-8401 or FTS 323-5401.

Some series publications, except *Biological Report*, *Fish Disease Leaflet*, and *Investigations in Fish Control*, are available at no charge from:

U.S. Fish and Wildlife Service
Publications Unit
Matomic Building, Room 148
Washington, DC 20240
(202) 253-6306 or FTS 254-6306

Publication Requests

When making request for publications please include the series name, number, author(s), and complete title. (Where telephone numbers are given above, FTS refers to the Federal Telecommunications Network.)

Table 1. Changes in names of Research and Development publications in 1985.

Former Name	New Name
Wildlife Leaflet	*Fish and Wildlife Leaflet*
Research Report *Wildlife Research Report*	*Fish and Wildlife Research*
Technical Paper *Special Scientific Report—Wildlife*	*Fish and Wildlife Technical Report*
FWS/OBS	*Biological Report*

Table 2. Description of publication series in Research and Development, 1985.

Series	Intended audience	Content	Presentation, format, and distribution
North American Fauna	Scientists, resource managers with technical background	Monographs; reports on long-term or basic research on life history, distribution, population dynamics, and taxonomy of animals, usually vertebrates.	Usually lengthy or may contain several titles under a single cover. Typeset. Presentation often includes much tabular and graphic material. Distributed to FWS, resource biologists, and author's distribution plan.
Fish and Wildlife Research	Scientists, resource managers with technical background	Scientific and technical reports; original research of scholarly quality; interpretive literature reviews or theoretical presentations.	Usually more than 25 printed pages per title; may contain several titles under a single cover. Typeset. Halftones or line drawings on blue, coated cover stock. Distributed to FWS, resource biologists, and author's distribution plan.
Fish and Wildlife Technical Report	Scientists, management personnel with technical background	Reports of investigations related to fish or wildlife; more limited in scope than those in *Fish and Wildlife Research* series. Typical subjects include advances in knowledge arising as by-products of broader studies, status or data reports, surveys, and techniques; and proceedings of technical conferences.	Usually less than 25 printed pages per title. Normally only one title per issue. Usually typeset, but lengthy tabular material or appendixes might be produced from typewritten copy. Halftones or line drawings on mauve, coated cover stock. Distributed to FWS, resource biologists, and author's distribution plan.
Resource Publication	Scientists, resource management personnel, lay public	Semitechnical or instructional material, lengthy reports, or material that requires numerous halftone or color illustrations. Typical products are guides, handbooks, bibliographies, manuals, historical reports, popular articles, and proceedings of nontechnical workshops or conferences.	Often lengthy. Usually typeset but extensive tables may be produced from typewritten copy. Halftones or line drawings on orange, coated cover stock. Distribution to FWS, resource biologists, public sale, and wildlife extension agents as depending on subject matter.

Fish and Wildlife Leaflet	Resource management personnel, technical personnel, lay public	Informational articles, primarily summaries of technical information for nontechnical readers. Each leaflet deals with a single subject. Typical subjects include topics of current interest, inventory and survey results, management techniques, and descriptions of imported fish or wildlife and their diseases.	Usually less than 12 pages with a single title per issue. May be either typeset or produced from typewritten copy. Distribution to FWS, short request list, and through fish and wildlife extension agents or public affairs officers.
Investigations in Fish Control	Scientists, management personnel with technical background	Technical reports on fish control research conducted primarily at the National Fishery Research Center–LaCrosse, Wisconsin.	Usually several brief papers in one issue. Typeset on matte paper. Tabular presentation frequent, but usually without halftones or line drawings. Distributed by National Fishery Research Center–LaCrosse, Wisconsin.
Fish Disease Leaflet	Management personnel with technical background	Summaries on specific fish disease problems (usually with an annotated bibliography); prepared mainly by the National Fish Health Research Center–Leetown, Kearneysville, West Virginia.	Usually brief, single-topic treatment in each issue. May be either typeset or produced from typewritten copy. Usually descriptive with no tables, halftones, or line drawings. Distribution by the National Fish Health Research Center–Leetown, Kearneysville, West Virginia.
Biological Report	Resource management personnel, technical personnel, lay public	Reports on the results of applied research, developments in technology, and ecological surveys and inventories of effects of land-use changes on fishery and wildlife resources. May include proceedings of workshops, technical conferences, or symposia; and interpretive bibliographies. Includes resource and wetland inventory maps.	Length variable. Usually a single title or subject per issue. Usually produced from word-processed copy, but may be typeset. Maps may be produced in multiple colors. A standard cover and format are used, although individual sub-series may have a distinctive format. Distributed according to author's distribution plan and responses to product announcements sent throughout the Service.

Table 3. Research and Development Centers of the U.S. Fish and Wildlife Service, September 1987.

Cooperative Fish and Wildlife Research Units Center
Matomic Building Room 527
Washington, DC 20240

National Fisheries Center–Great Lakes (Formerly Great Lakes Fishery Laboratory)
1451 Green Road
Ann Arbor, MI 48105

National Fisheries Center–Gainesville
7920 N.W. 21st Street
Gainesville, FL 23606

National Fisheries Center–Leetown
Box 700
Kearneysville, WV 25430

National Fisheries Contaminant Research Center (Formerly Columbia National Fishery Research Laboratory)
Route 1
Columbia, MO 65201

National Fishery Research Center–LaCrosse (Formerly National Fishery Research Laboratory)
P.O. Box 818
LaCrosse, WI 54602-0818

National Fishery Research Center–Seattle (Formerly Seattle National Fishery Research Center)
Building 204, Naval Station
Seattle, WA 98115

National Wetlands Research Center (Formerly National Coastal Ecosystems Team)
NASA–Slidell Computer Complex
1010 Gause Boulevard
Slidell, LA 70458

Alaska Fish and Wildlife Research Center
1011 East Tudor Road
Anchorage, AK 99503

National Ecology Research Center (Formerly Western Energy and Land Use Team)
2627 Redwing Road, Creekside One
Fort Collins, CO 80526-2899

National Wildlife Health Center (Formerly National Wildlife Health Laboratory)
6006 Schroeder Road
Madison, WI 53711

Northern Prairie Wildlife Research Center
P.O. Box 2096
Jamestown, ND 58402

Patuxent Wildlife Research Center
Laurel, MD 20708

Bibliography

North American Fauna

The *North American Fauna* series includes monographs and other reports of scientific investigations relating to North American vertebrates, invertebrates, plants, and biogeography. Investigation topics include basic research about life history, distribution, population dynamics, and taxonomy. Several titles may be included under a single cover. Publications are typeset and include tabular material and graphics. Standard size is 15 × 23 cm (6 × 9 in.) and length varies. The intended audience is research scientists. First issued in 1889 by the Division of Economic Ornithology and Mammalogy (Department of Agriculture) the series was continued by the Bureau of Biological Survey, and later, the Bureau of Sport Fisheries and Wildlife (Department of the Interior).

1. MERRIAM, C. H. 1889. Revision of the North American pocket mice. 40 pp.

   Reviews taxonomy of pocket mice (genus *Perognathus*) and provides key based on cranial characteristics. Introduces 12 new (1889) species: *P. bimaculatus, P. apache, P. inornatus, P. olivaceus, P. formosus, P. intermedius, P. fallax, P. obscurus, P. spinatus, P. paradoxus, P. californicus*, and *P. armatus*; three new subspecies are: *P. fasciatus flavescens, P. olivaceus amoenus,* and *P. paradoxus spilotus.*

2. MERRIAM, C. H. 1889. Descriptions of fourteen new species and one new genus of North American mammals. 52 pp.

   Describes and discusses 1 new (1889) genus, 13 new species, and 1 new subspecies of North American mammals: *Onychomys longipes, O. longicaudus, O. leucogaster melanophrys, Arctomys dacota, Lagomys schisticeps, Spermophilus mohavensis, S. neglectus, Tamias leucurus, Nyctinomus femorosaccus, N. mohavensis, Phenacomys, P. intermedius, P. celatus, P. latimanus*, and *P. ungava.* Provides diagnosis of genus *Onychomys.*

3. MERRIAM, C. H., AND L. STEINEGER. 1890. Results of a biological survey of the San Francisco Mountain Region and Desert of the Little Colorado, Arizona. 208 pp.

   Discusses general physical features of the San Francisco Mountain Region of Arizona, its zones, species and origin of flora and fauna in each zone, and climate. Makes generalizations concerning distribution of flora and fauna in North America. Includes annotated list of mammals, birds, reptiles, and amphibians of the San Francisco Mountain Plateau and Little Colorado Desert, with new (1890) species described. Describes Grand Canyon area and lists its mammals and birds.

4. MERRIAM, C. H. 1890. Descriptions of twenty-six new species of North American mammals. 67 pp.

   Revises the genus *Spilogale* (little striped skunks) and describes six new (1890) species: *S. ringens, S. indianola, S. lucasana, S. leucoparia, S. saxatilis*, and *S. phenax,* and one new subspecies: *S. p. latifrons.* Also describes new species and subspecies of other genera: *Tamias castanuris, T. chrysodeirus, T. cinerascens, T. interpres, T. minimus melanurus, Evotomys galei, E. occidentalis, E. californicus, Mustela caurina, Molossus californicus, Cynomys leucurus, Spermophilus canescens, S. spilosoma macrospilotus, S. s. major, Dipodomys ambiguus, D. spectabilis, D. californicus, Geomys bursarius lutescens,* and *Hersperomys macropus.*

5. MERRIAM, C. H., AND L. STEINEGER. 1891. Results of a biological reconnaissance of south-central Idaho.
   MERRIAM, C. H. Descriptions of a new genus and two new species of North American mammals. 138 pp.

   Describes flora and fauna of the region and includes six life zones for Idaho. Provides annotated lists of mammals, birds, reptiles, and amphibians. Describes a new (1891) genus and two new species of mammals: *Microdipodops, M. megacephalus*, and *Evotomys gapperi brevicaudus.*

6. [Not issued]

7. FISHER, A. K., L. STEINEGER, C. H. GILBERT, C. V. RILEY, R. E. C. STEARNS, C. H. MERRIAM, AND T. S. PALMER. 1893. The Death Valley expedition: a biological survey of parts of California, Nevada, Arizona, and Utah. Part II: 1) Birds, 2) Reptiles and batrachians, 3) Fishes, 4) Insects, 5) Mollusks, 6) Desert trees and shrubs, 7) Desert cactuses and yuccas, 8) Lists of localities. 438 pp.

   Describes birds, reptiles, amphibians, fishes, insects, mollusks, trees, shrubs, cacti, and yuccas; and the localities of California, Nevada, and western Utah and Arizona in which they are found.

8. MERRIAM, C. H. 1895. Revision of the pocket gophers, family Geomyidae (exclusive of the species of *Thomomys*). 264 pp.

   Describes the taxonomy, biology, food habits, distribution in the United States and Mexico, and color phases of the family Geomyidae. Includes extensive sections on skull morphology and dentition. Provides systematic descriptions of genera and species.

9. [Not issued]

10. MERRIAM, C. H. 1895. Revision of the shrews of the American genera *Blarina* and *Notiosorex*.
    MILLER, G. S., JR. The long-tailed shrews of the eastern U.S.
    MERRIAM, C. H. Synopsis of the American shrews of the genus Sorex. 124 pp.

    Reviews taxonomy, distribution, and description of genera *Blarina*, *Notiosorex*, and *Sorex*. Provides keys for *Blarina* and *Sorex*.

11. MERRIAM, C. H. 1896. Synopsis of the weasels of North America. 54 pp.

    Provides a key to the subgenera *Putorius* (ferrets) and *Ictis* (weasels), and offers a list of North American weasels. Describes species of subgenera and includes table of cranial measurements.

12. MILLER, G. S., JR. 1896. The genera and subgenera of voles and lemmings. 89 pp.

    Describes the subfamily Microtinae and its main divisions, lists genera and subgenera, and discusses distribution, habits, nomenclature, historical taxonomy, and characters on which 1896 classification of *Microtus* was based. Provides key and descriptions of genera and subgenera.

13. MILLER, G. S., JR. 1897. Revision of the North American bats of the family Vespertilionidae. 147 pp.

    Discusses specimens; color variation as a result of preservation; sexual, age, and geographic variation; geographic distribution and migration; and measurements. Provides names and descriptions of genera, subgenera, species, and subspecies.

14. NELSON, E. W., L. STEINEGER, M. J. RATHBURN, J. N. ROSE, AND E. W. NELSON. 1899. Natural history of the Tres Marias Islands, Mexico: general account of the Islands with reports on mammals and birds. 1) Reptiles, 2) Note on crustacea, 3) Plants, 4) Bibliography. 97 pp.

    Provides a general description of Tres Marias Islands and annotated lists of mammals, birds, reptiles, crustaceans, and plants.

15. PREBLE, E. A. 1899. Revision of the jumping mice of the genus *Zapus*. 43 pp.

    Describes the genus *Zapus* and discusses history, distribution, and habits. Provides a list of genera, species, and subspecies; a key to subgenera, including two new (1899) subgenera (*Napaeozapus* and *Eozapus*); and descriptions of species.

16. MERRIAM, C. H. 1899. Results of a biological survey of Mount Shasta, California. 179 pp.

    Describes topography, forests, slope exposure, and life zones of the Shasta Mountain region. Contrasts the flora and fauna with those of the Sierra and Cascade regions. Briefly covers forest fire effects on zones; Klamath Gap as a barrier; and faunal origins of the Shasta, Sierra, and Cascade regions. Provides annotated lists of mammals and birds, and notes on distribution of plants.

17. BAILEY, V. 1900. Revision of American voles of the genus *Microtus*. 88 pp.

    Discusses breeding, food habits, and the economic status of the genus *Microtus*. Provides keys to subgenera, species, and subspecies, and describes the species.

18. OSGOOD, W. H. 1900. Revision of the pocket mice of the genus *Perognathus*. 81 pp.

    Discusses history, specimens, distribution, color, pelages, habits, classification, and new (1900) species of the genus *Perognathus*. Provides a key to species and subspecies, their descriptions, and locations.

19. OSGOOD, W. H. 1900. Results of a biological reconnaissance of the Yukon region; general account of the region.
    BISHOP, L. B. Annotated list of birds. 100 pp.

    Describes faunal districts and new (1900) species, and provides annotated lists of birds and mammals.

20. HOWELL, A. H. 1901. Revision of the skunks of the genus *Chincha* [*Mephitis*]. 80 pp.

    Discusses history, distribution, habits, morphology, specimens, and nomenclature of the genus *Mephitis* (formerly *Chincha*). Provides a key to species and subspecies, their descriptions, and locations.

21. OSGOOD, W. H. 1901. Natural history of the Queen Charlotte Islands, British Columbia; and natural history of the Cook Inlet region, Alaska. 87 pp.

    Discusses physiography, flora, fauna, and life zones of Queen Charlotte Islands and Cook Inlet region. Provides annotated bird and mammal lists for both regions.

22. PREBLE, E. A. 1902. A biological investigation of the Hudson Bay region. 140 pp.

    Briefly describes the region traversed and discusses life zones, previous work, and new species. Provides annotated lists of mammals, birds, and amphibians, and a bibliography.

23. PALMER, T. S. 1904. Index generum mammalium: a list of the genera and families of mammals. 984 pp.

    Discusses history of taxonomy and provides: 1) annotated list of generic names of mammals, 2) alphabetical list of families of mammals, and 3) classified list of generic names, arranged by orders and families.

24. OSGOOD, W. H. 1904. A biological reconnaissance of the base of the Alaska Peninsula. 86 pp.

    Describes author's journey, area studied, life zones, and previous work. Provides annotated lists of birds and mammals.

25. BAILEY, V. 1905. Biological survey of Texas: life zones, with characteristic species of mammals, birds, reptiles, and plants. 222 pp.

    Describes life zones and lists their mammals, birds, lizards, snakes, and plants. Provides a report on the Biological Survey collection of lizards, and an annotated mammals list.

26. HOWELL, A. H. 1906. Revision of the skunks of the genus *Spilogale*. 65 pp.

    Discusses history, specimens, distribution, habits, food, morphology, and nomenclature of the genus *Spilogale*. Provides a key to species and subspecies, their descriptions, and locations.

27. PREBLE, E. A. 1908. A biological investigation of the Athabaska–Mackenzie region. 574 pp.

    Describes the geography and climate of the Mackenzie Basin, Canada, and the life zones of the entire Athabaska–Mackenzie region. Discusses previous explorations and collections, and describes the route covered by Biological Survey parties of 1901, 1903, and 1904. Provides annotated lists of mammals, birds, reptiles, amphibians, fishes, trees, and shrubs. Includes a bibliography.

28. OSGOOD, W. H. 1909. Revision of the mice of the American genus *Peromyscus*. 285 pp.

    Discusses specimens, history, nomenclature, variation, pelages, colors, measurements, habits, economic status, keys, specimen records, and subgenera of white-footed or deer mice. Describes and gives locations of species and subspecies.

29. NELSON, E. W. 1909. The rabbits of North America. 314 pp.

    Discusses the following aspects of North American rabbits: 1) relations with agriculture, 2) distribution, 3) habits, 4) diseases, 5) color, 6) dichromatism, 7) molts, 8) variation, 9) skull characters, and 10) genera and subgenera. Provides a key to species and subspecies, their descriptions, and locations.

30. OSGOOD, W. H. 1909. Biological investigations in Alaska and Yukon Territory: 1. East-central Alaska; 2. Ogilvie Range, Yukon; 3. Macmillan River, Yukon. 96 pp.

    Provides a general description and annotated bird and mammal lists for east-central Alaska; and the Ogilvie Range and Macmillan River, Yukon Territory.

31. GOLDMAN, E. A. 1910. Revision of the wood rats of the genus *Neotoma*. 124 pp.

    Discusses specimens, history, distribution, habits, economic status, and morphology of wood rats. Provides keys to subgenera, species, and subspecies; lists species and subspecies and their locations; and describes species.

32. HOLLISTER, N. 1911. A systematic synopsis of the muskrats. 47 pp.

    Discusses history, distribution, habits, economic status, morphology, and fossils of Muskrats (*Neofiber* or *Fiber*). Provides a key to species and subspecies, lists their locations, and describes existing and fossil species.

33. CARY, M. 1911. A biological survey of Colorado. 256 pp.

    Characterizes five life zones, defines their extent and limits, and discusses their agricultural and economic possibilities. Lists Colorado mammals and provides notes on their habits, distribution, and economic relations. Lists principal observed trees and shrubs of Colorado. Includes mammal distribution maps.

34. GOLDMAN, E. A. 1911. Revision of the spiny pocket mice (genera *Heteromys* and *Liomys*). 70 pp.

    Discusses history, specimens, habits, economic status, color, pelages, measurements, and subgenera of spiny pocket mice. Provides keys to genera, subgenera, species, and subspecies; lists species and subspecies locations; and describes species.

35. BAILEY, V. 1913. Life zones and crop zones of New Mexico. 100 pp.

    Discusses geography, climate, agricultural practices, and crops of each life zone in New Mexico. Provides mammal, breeding bird, reptile, amphibian, and plant species list for each zone. Includes a life zone map.

36. HOWELL, A. H. 1914. Revision of the American harvest mice (genus *Reithrodontomys*). 97 pp.

    Discusses history, specimens, habits, economic status, food, and pelages of American harvest mice. Lists locations and provides a key to species and subspecies, and provides species descriptions.

37. HOWELL, A. H. 1915. Revision of the American marmots. 80 pp.

Discusses history, nomenclature, common names, habits, external characters, and specimens of American marmots. Describes, lists locations, and provides a key to species and subspecies.

38. JACKSON, H. H. T. 1915. A review of the American moles. 100 pp.

    Discusses habits; economic status; characteristics and development of young; pelages and molts; and geographic, individual, sexual, and age variation. Describes subfamilies, history, and generic names of the family Talpidae. Describes, lists locations, and provides a key for genera, species, and subspecies.

39. BAILEY, V. 1915. Revision of the pocket gophers of the genus *Thomomys*. 136 pp.

    Describes habits, predators, morphology, sexual variation, pelages, and distribution of pocket gophers. Describes genera and group relations. Describes, lists locations and distribution, and provides a key for species and subspecies.

40. HOLLISTER, N. 1916. A systematic account of the prairie-dogs. 37 pp.

    Discusses distribution, habits, economic status, predators, nomenclature, specimens, and pelages of prairie dogs. Describes, lists locations, and provides a key for species and subspecies.

41. MERRIAM, C. H. 1918. Review of the grizzly and big brown bears of North America (genus *Ursus*), with description of a new genus, *Vetularctos*. 136 pp.

    Discusses distribution, sexual and age differences, specimens, and classification of North American grizzly and big brown bears. Describes and lists locations of species and subspecies. Mentions *Vetularctos*, a new genus related to *Ursus*.

42. CARY, M. 1917. Life zone investigations in Wyoming. 95 pp.

    Characterizes five transcontinental life zones in Wyoming; defines their extent and limits; lists mammal, breeding bird, reptile, amphibian, and plant species; and provides notes on distribution and abundance of trees observed during the survey.

43. GOLDMAN, E. A. 1918. The rice rats of North America (genus *Oryzomys*). 100 pp.

    Discusses habits, economic status, morphology, variation, history, and specimens of North American rice rats. Provides a key and descriptions for species and subspecies.

44. HOWELL, A. H. 1918. Revision of American flying squirrels. 64 pp.

    Discusses habits, nests, breeding, food, economic status, pelage, molt, and specimens of American flying squirrels (*Glaucomys*). Describes history, nomenclature, and characters of *Glaucomys*. Provides a list of locations, descriptions, and a key to species and subspecies.

45. HOWELL, A. H. 1921. A biological survey of Alabama: I. Physiography and life zones. II. The mammals. 88 pp.

    Briefly discusses physiography, life zones, and mammals of Alabama. Provides an annotated species list of mammals.

46. PREBLE, E. A., W. L. MCATEE, ET AL. 1923. A biological survey of the Pribilof Islands, Alaska: I. Birds and mammals. II. Insects, arachnids, and chilopods. 255 pp.

    Describes region and life zone relations of species found on Pribilof Islands, Alaska. Provides annotated species lists of birds, mammals, insects, arachnids, and chilopods.

47. HOWELL, A. H. 1924. Revision of the American pikas (genus *Ochotona*). 67 pp.

    Discusses distribution, habitat, habits, pelage, molt, specimens, history, and nomenclature of pikas. Provides descriptions, locations, and a key for species and subspecies.

48. HOWELL, A. B. 1926. Voles of the Genus *Phenacomys*: I. Revision of the genus *Phenacomys*. II. Life history of the red tree mouse (*Phenacomys longicaudus*). 82 pp.

    Discusses distribution, habits, specimens, history, morphology, and variations of voles of the genus *Phenacomys*. Describes, lists locations, and provides a key for species and subspecies. Describes and discusses nests, food habits of young, and predators of the red tree mouse.

49. BAILEY, V. 1926. A biological survey of North Dakota: I. Physiography and life zones. II. The mammals. 247 pp.

    Discusses the physiography and life zones of North Dakota, with a map of life zones. Provides a list of mammals, which includes a brief description of each animal, its distribution, abundance, habitat, and habits.

50. HOWELL, A. B. 1927. Revision of the American lemming mice (genus *Synaptomys*). 51 pp.

    Discusses distribution, habits, specimens, history, morphology, and variation of American lemming mice. Provides a subgenera key. Provides descriptions, locations, and a key for species and subspecies.

51. JACKSON, H. H. T. 1928. A taxonomic review of the American long-tailed shrews (genera *Sorex* and *Microsorex*). 275 pp.

    Briefly discusses distribution, habitat, habits, food, economic status, young, and specimens of

American long-tailed shrews. Describes pelages, molts, history, and variation of long-tailed shrews, and mentions family Soricidae. Lists locations and provides a key to genera, species, and subspecies. Includes descriptions of species and subspecies.

52. HOWELL, A. H. 1929. Revision of the American chipmunks (genera *Tamias* and *Eutamias*). 157 pp.

    Discusses geographic distribution, life history, history, nomenclature and morphology of American chipmunks. Provides keys to genera, subgenera, species, and subspecies. Includes species and subspecies descriptions and locations.

53. BAILEY, V. 1931. Mammals of New Mexico. 412 pp.

    Discusses mammal collectors and collections, geographic variation, useful and injurious species, game protection, control of noxious species, and problems in mammalian study. Provides annotated list of mammal species.

54. MURIE, O. J. 1935. Alaska–Yukon caribou. 93 pp.

    Describes the caribou (*Rangifer tarandus*), its relation to man, status, abundance, breeding, food, migratory habits, habitat, distribution, and taxonomic status. Briefly discusses the caribou of British Columbia and Alberta.

55. BAILEY, V. 1936. The mammals and life zones of Oregon. 416 pp.

    Describes life zones and their characteristic mammals, birds, and plants. Provides annotated list of mammal species.

56. HOWELL, A. H. 1938. Revision of the North American ground squirrels, with a classification of the North American Sciuridae. 256 pp.

    Describes distribution of ground squirrels and discusses habits and economic status of individual species. Provides a classification of Sciuridae and descriptions of species and subspecies.

57. LEHMANN, V. W. 1941. Attwater's prairie-chicken—its life history and management. 65 pp.

    Describes taxonomic distinction, former abundance, and former and present distributions of Attwater's prairie-chicken (*Tympanuchus cupido attwateri*). Discusses habits, habitat requirements, and limiting factors; and management, including protection, habitat improvement, predator control, harvest, and restocking.

58. NEFF, J. A. 1947. Habits, food, and economic status of the band-tailed pigeon. 76 pp.

    Describes the band-tailed pigeon (*Columba fasciata*) and its habits, predators, diseases, and distribution. Discusses food habits in detail, including mineral salt use, results of stomach and crop analysis, gravel use, and seasonal food preferences. Discusses the value of the band-tailed pigeon as a game bird, and its effect on crop depredations.

59. GOLDMAN, E. A. 1947. The pocket gophers (genus *Thomomys*) of Arizona. 39 pp.

    Discusses Arizona pocket gopher groups and their economic status. Provides species and subspecies descriptions.

60. GOLDMAN, E. A., AND H. T. JACKSON. 1950. Raccoons of North and Middle America. 153 pp.

    Discusses history, habits, economic status, morphology, and specimens of raccoons (*Procyon*). Provides a key to subgenera, species, and subspecies; and descriptions and locations for species and subspecies.

61. MURIE, O. J. 1959. Fauna of the Aleutian Islands and Alaska Peninsula.
    SCHEFFER, V. B. Invertebrates and fishes collected in the Aleutians, 1936–38. 406 pp.

    Discusses geography, geology, climate, environment, biotic distribution, and vegetation of the Aleutian Islands and Alaska Peninsula. Provides annotated species lists for birds, mammals, and marine, freshwater, and land invertebrates.

62. STEWART, R. E., AND C. S. ROBBINS. 1958. Birds of Maryland and the District of Columbia. 401 pp.

    Discusses history, bird–land-use relations, and distribution of birds in Maryland and the District of Columbia. Birds are listed for oak-pine, oak-chestnut, and mixed mesophytic forest regions. Status and migration data are included for each species. A map is provided.

63. BANKO, W. E. 1960. The trumpeter swan: its history, habits, and population in the U.S. 214 pp.

    Discusses trumpeter swan (*Cygnus buccinator*) distribution, status, habitats, description, behavior, nesting, food, development, longevity, limiting factors, and population dynamics. Describes management—particularly National Park Service investigations and Red Rock Lakes National Wildlife Refuge (Montana) management. Makes management recommendations.

64. SCHEFFER, V. B. 1961. Pelage and surface topography of the northern fur seal. 206 pp.

    Structure and body covering of the northern fur seal (*Callorhinus ursinus*) are discussed in great detail. Pelages of different ages and sexes are described and variation is mentioned. The sealskin industry is reviewed.

65. SAUNDERS, G. B. 1968. Seven new white-winged doves from Mexico, Central America, and southwestern United States. 30 pp.

    Seven new subspecies of *Zenaida asiatica* are described: *Z. a. peninsulae* of the Yucatan Peninsula,

Mexico; *Z. a. grandis* of the upper Big Bend area, central western Texas; *Z. a. monticola* of the Mexican interior plateaus and highlands; *Z. a. palustris* of the central and southern Pacific coastal plains of Mexico; *Z. a. insularis* of the Tres Marias Islands, Nayarit, Mexico; *Z. a. collina* of Central America, chiefly on the Pacific Piedmont and coastal plain from the Isthmus of Tehuantepec, Mexico, to Costa Rica; and *Z. a. panamensis* of the northeast coast of the Azuero Peninsula, Panama.

66. PARADISO, J. L. 1969. Mammals of Maryland. 193 pp.

    Discusses area, temperature, precipitation, effects of civilization, principal biotic or natural areas, and mammalian fauna of Maryland. Includes keys and brief species accounts.

67. MEANLEY, B. 1969. Natural history of the king rail. 108 pp.

    Describes the king rail (*Rallus elegans*) and discusses its history, taxonomy, distribution, migration, habitats, breeding biology, feeding behavior, and mortality. Includes sections on development and behavior of captive rails, and value as a game bird.

68. KENYON, K. W. 1969. The sea otter in the eastern Pacific Ocean. 352 pp.

    Describes the sea otter (*Enhydra lutris*), and discusses its behavior in general, when feeding, and in captivity. Discusses taxonomy, habitat requirements, distribution and numbers, limiting factors, and reproduction. Suggests future management and research needs.

69. MEANLEY, B. 1971. Natural history of the Swainson's warbler. 90 pp.

    Describes the Swainson's warbler (*Limnothlypis swainsonii*), its breeding biology, song, feeding behavior, and food. Discusses history, distribution, migration, habitat, and factors affecting population.

70. BROWNING, M. R. 1975. The distribution and occurrence of the birds of Jackson County, Oregon, and surrounding areas. 69 pp.

    Describes topography, climate, vegetation, and avian communities of the area. Abundance, frequency, and seasonal occurrence information is provided for each species.

71. VANCAMP, L. F., AND C. J. HENNY. 1975. The screech owl: its life history and population ecology in northern Ohio. 65 pp.

    Presents basic life history and population data for screech owls (*Otus asio*) in northern Ohio, as a result of capture and banding and food habit studies, during 1944–73. Includes discussions of food habits, migration and dispersal, breeding biology, population dynamics, pesticides and pollution, and polymorphism.

72. WILBUR, S. R. 1978. The California condor, 1966–76: a look at its past and future. 136 pp.

    The California condor (*Gymnogyps californianus*) was studied on about 900 field days between 1966 and 1976. In addition, about 1,000 items of literature, specimen records from 56 museums, and 3,500 reports of condor sightings by cooperators were analyzed. Distribution, seasonal movements, and population numbers were studied and described. Causes of decline and low production are discussed. Describes condor recovery plan.

73. FAANES, C. A. 1981. Birds of the St. Croix River Valley: Minnesota and Wisconsin. 196 pp.

    Presents and discusses results of avian distribution and abundance survey in the St. Croix River Valley from 1966 to 1980. Includes published and unpublished observations by ornithologists. Species accounts include status, migration, nesting season distribution, and habitat information.

74. FAY, F. H. 1981. Ecology and biology of the Pacific Walrus, *Odobenus rosmarus divergens*, Illiger. 279 pp.

    The distribution, physical development, pelage, dentition, feeding behavior, reproduction, causes of mortality, and population structure of the Pacific walrus were studied intermittently from 1952 to 1979.

Wildlife Research Report

The *Wildlife Research Report* series contains reports and specialized bibliographies relating to birds, mammals, and other wildlife and their ecology. Intended audiences are research scientists and technically trained management personnel. Subjects include scientific and technical papers based on original wildlife research, and may include literature reviews. Publications are typeset and have a standard size of 18 × 25 cm (6 7/8 × 9 7/8 in.); length varies. This is a continuation of the *Research Report* series which was established in 1941 by consolidating the *Wildlife Research Bulletins* (which had been established in 1939 by the former Bureau of Biological Survey, which in turn superseded *Biological Survey Bulletins* established in 1885, *Department of Agriculture Bulletins* established in 1913, and the *Technical Bulletins* established in 1927). *Wildlife Research Report* series was first issued in 1972. In 1985 it was combined with *Research Report* and renamed *Fish and Wildlife Research.*

1. HENNY, C. J. 1972. An analysis of the population dynamics of selected avian species. With special reference to changes during the modern pesticide era. 99 pp.

   Impact of pesticides on mortality and recruitment rates for 16 nongame bird species; more than 25 years was evaluated. A mathematical model of the relations between population parameters yielding stable populations was developed. Variables in the model are: 1) mortality rate schedule, 2) recruitment rates, and 3) the age of sexual maturity. Population parameters were compared to determine whether changes had occurred between periods. Species subjected to analysis were great horned owl (*Bubo virginianus*), red-shouldered hawk (*Buteo lineatus*), American kestrel (*Falco sparverius*), osprey (*Pandion haliaetus*), common barn-owl (*Tyto alba*), Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), great blue heron (*Ardea herodias*), black-crowned night-heron (*Nycticorax nycticorax*), brown pelican (*Pelecanus occidentalis*), barn swallow (*Hirundo rustica*), chimney swift (*Chaetura pelagica*), blue jay (*Cyanocitta cristata*), black-capped chickadee (*Parus atricapillus*), northern cardinal (*Cardinalis cardinalis*), and American robin (*Turdus migratorius*).

2. SMITH, R. I., J. R. PALMER, AND T. S. BASKETT, EDITORS. 1972. Population ecology of migratory birds. Papers from a symposium held at the Migratory Bird Populations Station, Laurel, Maryland, 9–10 October 1969. Sponsored by the American Institute of Biological Sciences in cooperation with the Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior. 278 pp.

   Papers presented include 1) Mallard migration corridors as revealed by population distribution, banding, and radar; 2) The relevance of the mapping census technique to the conservation of migratory bird populations; 3) Population ecology of the Australian black-billed magpie (*Pica pica*), royal penguin (*Eudyptes schlegeli*), and silver gull (*Larus novaehollandiae*) in Australia; 4) Influence of territory on structure and dynamics of bird populations; 5) Aspects of mallard breeding ecology in Canadian parkland and grassland; 6) Some problems in estimating survival from banding data; 7) The importance of movements in the biology of herring gulls in New England; 8) Role of banding data in migratory bird population studies; 9) Population ecology and environmental pollution: red-tailed (*Buteo jamaicensis*) and Cooper's (*Accipiter cooperii*) hawks; 10) British studies of goose populations: hindsight as an aid to foresight; and 11) Population ecology of migratory birds: symposium summary.

3. BOGAN, M. A. 1975. Geographic variation in *Myotis californicus* in the southwestern United States and Mexico. 31 pp.

   Geographic variation in the California bat (*Myotis californicus*) in the southwestern United States and Mexico was analyzed by univariate and multivariate statistical procedures. Variation in bats in the study area is explained by isolation of populations during pluvial times. No revisions in nomenclature seemed necessary. Different phenetic groups, pelage color variation, and sexual dimorphism are discussed.

4. HUSAR, S. L. 1975. A review of the literature of the dugong (*Dugong dugon*). 30 pp.

5. STATON, M. A., AND J. R. DIXON. 1977. Breeding biology of the spectacled caiman, *Caiman crocodilus crocodilus*, in the Venezuelan Llanos. 21 pp.

Breeding biology of the spectacled caiman (*Caiman Crocodilus crocodilus*) in the Venezuelan Llanos was studied during the latter part of the 1973 breeding season and the beginning of the 1974 season. Courtship, copulation, nesting, nest care, hatching, and postnatal care are discussed. Data include clutch size, egg measurements, internal nest temperatures and relative humidity, incubation period, and hatchling measurements.

6. JOHNSON, D. H., AND A. B. SARGEANT. 1977. Impact of red fox predation on the sex ratio of prairie mallards. 56 pp.

   The role that red fox (*Vulpes vulpes*) predation may play in causing unbalanced sex ratios among dabbling ducks was examined. A simple model of mallard (*Anas platyrhynchos*) population dynamics, as affected by fox predation, hunting, and other mortality, was developed for the prairie pothole region of North Dakota during 1963–73. Validity of the model is assessed mathematically and by comparison with field studies.

7. HUSAR, S. L. 1977. The West Indian manatee (*Trichechus manatus*). 22 pp.

   The life history of the West Indian manatee (*Trichechus manatus*) is presented. Exploitation, legislation, protection, and conservation of the manatee are also discussed.

8. BURY, R. B., R. A. LUCKENBACH, AND S. D. BUSACK. 1977. Effects of off-road vehicles on vertebrates in the California desert. 23 pp.

   The effects of off-road vehicles on numbers of species, abundance, biomass, diversity, and density of vertebrates in creosote shrub habitat in eastern California was investigated. Changes in the vertebrate community resulting from off-road vehicle use are documented.

9. OHLENDORF, H. M., R. W. RISEBROUGH, AND K. VERMEER. 1978. Exposure of marine birds to environmental pollutants. 40 pp.

   Investigations of the effects of environmental pollutants on marine birds are reviewed. Petroleum hydrocarbons are described, and their sources in U.S. waters as well as their transfer and dissipation in marine environments are discussed. Other pollutants described include organochlorines, heavy metals, plastic, rubber, and refuse. Biological effects of exposure of marine birds to each pollutant are described. Recommendations for future investigations are suggested.

10. REEVES, R. R. 1978. Atlantic walrus (*Odobenus rosmarus rosmarus*): a literature survey and status report. 41 pp.

    A literature survey of the Atlantic walrus (*Odobenus rosmarus rosmarus*), including information about the biology, ecology, exploitation, and status of the walrus. Management practices to increase walrus populations are suggested.

11. BARTONEK, J. C., AND D. N. NETTLESHIP, EDITORS. 1979. Conservation of marine birds of northern North America. Papers from the international symposium held at the Seattle Hyatt House, Seattle, Washington, 13–15 May 1975. 319 pp.

    Includes papers presented on the following subjects: 1) status of marine bird populations, 2) biology and ecology of marine birds in the North, 3) conflicts between conservation of marine birds and uses of other resources, 4) programs and authorities related to marine bird conservation, and 5) conservation of marine birds in other lands.

12. BURY, R. B., EDITOR. 1982. North American tortoises: conservation and ecology. In cooperation with the World Wildlife Fund. vii + 126 pp.

    A synthesis of information is presented on the status of the four species of tortoises endemic to North America, desert tortoise (*Gopherus agassizii*), Berlandier's tortoise (*G. berlandieri*), gopher tortoise (*G. polyphemus*), and Bolson tortoise (*G. flavomarginatus*). Factors reducing populations of tortoises are described and principal corrective actions are suggested.

13. SCOTT, N. J., JR., EDITOR. 1982. Herpetological communities. A symposium of the Society for the Study of Amphibians and Reptiles and the Herpetologists' League, August 1977. iv + 239 pp.

    Two review papers are followed by eight studies of amphibian, snake, and lizard communities, four studies of entire assemblages from tropical and sandy soil habitats, and three papers dealing with field techniques for the study of herpetofaunal communities. Final paper gives historical resume of herpetological community studies, a summary of papers in the volume, and recommendations for the future.

14. DWYER, T. J., AND G. L. STORM, TECHNICAL COORDINATORS. 1982. Woodcock ecology and management. Papers from the Seventh Woodcock Symposium held at the Pennsylvania State University, University Park, 28–30 October 1980. 191 pp.

    Papers given discuss techniques of woodcock management such as singing-ground surveys, population inferences, visual and audio identification, and sex and age determination. Ecology subject matter includes nest sites, brooding, breeding, movement, home range, and reproductive activity indicators. Also examined are land use and habitat management and history of the woodcock.

15. KANTRUD, H. A., AND R. L. KOLOGISKI. 1982. Effects of soils and grazing on breeding birds of uncultivated upland grasslands of the northern Great Plains. 33 pp.

Effects of grazing on various birds of the Great Plains grasslands were measured using bird censuses and plant surveys during 1974–78 on lightly, moderately, and heavily grazed native rangeland plots. Bird species evaluated were: horned lark (*Eremophila alpestris*), western meadowlark (*Sturnella neglecta*), lark bunting (*Calamospiza melanocorys*), and chestnut-collared longspur (*Calcarius ornatus*). Parameters investigated were composition of dominant species, species richness, and density. Variables affecting the parameters were soil type, temperature, moisture, and organic matter content, as well as grazing. Dominant plants were *Agropyron* spp. and *Bouteloua gracilis*. Optimum habitat for each bird species is described in terms of grazing, soils, and dominant plant species.

Research Report

The *Research Report* series contains scientific and technical papers about original fishery research. Publications are typeset and have a standard size of 18 × 25 cm (6 7/8 × 9 7/8 in.); length varies. Intended audiences are research scientists and technically trained management personnel. This series supersedes *Investigational Report* of the Bureau of Sport Fisheries and *Wildlife Research Bulletin* of the Bureau of Biological Survey, both initiated in 1920. These series were discontinued in 1940 when the Bureaus merged to form the Fish and Wildlife Service. First issued in 1941, the *Research Report* series was combined with the *Wildlife Research Report* series in 1985 and renamed *Fish and Wildlife Research.*

1. STANSBY, M. E., AND J. M. LEMON. 1941. Studies on the handling of fresh mackerel (*Scomber scombrus*). 46 pp.

   Discusses results of mackerel (*Scomber scombrus*) studies conducted as a basis for recommendations leading to increased distribution and popularity of mackerel. Includes discussion on improved handling methods, fat content, storage, and marketing.

2. LOOSANOFF, V. L., AND J. B. ENGLE. 1942. Use of lime in controlling starfish. 29 pp.

   Describes methods and effects of lime on starfish (*Asterias forbesi*). Presents and discusses results of eradication experiments and examines effects of lime on other animals. Makes management recommendations.

3. LANHAM, W. B., JR., AND H. W. NILSON. 1942. The effect of heat and moisture on the feeding value of pilchard meal. 10 pp.

   Reports and discusses results of experiments in which rats and chicks were fed purified diets incorporating pilchard meal. The effects of increased heat and high humidity on the nutritive value of the meal were examined.

4. NILSON, H. W., AND J. M. LEMON. 1942. Metabolism studies with algin and gelatin. 9 pp.

   Studies were conducted on male rats over a period of 10 weeks to determine nutritive effects of vegetable gum of algin and protein of gelatin.

5. ALDOUS, S. E. 1942. The white-necked raven in relation to agriculture. 56 pp.

   Presents results of a 5-year study of white-necked raven chihuahuan (formerly white-necked) (*Corvus cryptoleucus*) activities and food habits. Contents of 827 stomachs were analyzed. Includes data on life history, damage, economic status, and crop protection.

6. STANSBY, M. E., AND F. P. GRIFFITHS. 1943. Preparation and keeping quality of lightly smoked mackerel. 10 pp.

   Describes preparation, sampling procedure, and changes during preparation of smoked mackerel (*Scomber scombrus*). Discusses storage and factors influencing rancidity.

7. JARVIS, N. D. 1943. Principles and methods in the canning of fishery products. 366 pp.

   Discusses scientific principles on which canning is based, outlines various engineering problems faced by the canner, and gives a detailed description of current methods used in the commercial canning of 58 varieties of fish and shellfish packed commercially in hermetically sealed containers. Information on spoilage and methods used in the examination of fishery products is provided.

8. JACKSON, H. T. 1944. Big game resources of the United States 1937–1942. 56 pp.

   Discusses big game estimates and counts and provides 1941 big game inventory. Presents population trends in principal big game species and on different land-classification areas. Gives game kill data.

9. ELLIS, M. M., B. A. WESTFALL, AND M. D. ELLIS. 1946. Determination of water quality. 122 pp.

   Methods are presented for the determination of those characteristics of natural waters that are of major importance to aquatic biologists in connection with fisheries problems. Both unpolluted and polluted waters have been considered, and procedures for the evaluation of pollution hazards outlined. Usually more than one method for each type of determination is offered to meet the different degrees of accuracy required in several types of studies.

10. PALMER, L. J., AND C. H. ROUSE. 1946. Study of the Alaska tundra with reference to its reactions to reindeer and other grazing. 48 pp.

    Lists tundra plants and describes vegetation types and their reactions to cutting and denuding treatments. Suggests management techniques for caribou (formerly reindeer) (*Rangifer tarandus*).

11. GALTSOFF, P. S. 1946. Reaction of oysters to chlorination. 28 pp.

    Reaction of oysters to free chlorine was studied by recording shell movement, measuring the rate of flow of water through the gills, and determining the beat frequency of the lateral cilia of the gills.

12. DAVIS, H. S. 1946. Care and diseases of trout. 98 pp.

    Discusses the care of trout, including the care of ponds and raceways, feeding methods, and foods—especially the use of dry products for supplementing fresh meat in the diet. Mentions improvement of brood stock, parasites, and diseases. Describes each disease, including symptoms, etiology, pathology, and control methods.

13. PEARCE, J. 1947. Identifying injury by wildlife to trees and shrubs in northeastern forests. 29 pp.

    Discusses injury by rodents, brousing animals, black bears (*Ursus americanus*), birds, and wildcats. Briefly describes chewing tags, gnawing around den entrances, gnawing stakes, and tree flooding by beavers (*Castor canadensis*).

14. PEARSON, J. C. 1948. Fluctuations in the abundance of the blue crab in Chesapeake Bay. 26 pp.

    Analyzes catch per unit of fishing effort of blue crabs (*Callinectes sapidus*) and correlates abundance data with variable survival rates in the first year of life and volume of discharge from James and Potomac rivers. Relative abundance of female adults and their progeny was studied, as was the influence of spawning stock size on population size surviving to commercial age.

15. WARFEL, H. E., AND J. A. CLAGUE. 1950. Shark fishing potentialities of the Philippine Seas. 19 pp.

    Exploratory fishing with longlines and gill nets was done to determine potential value of sharks. Describes region, fishing gear, and operational factors. Discusses production results, vitamin A and oil content of livers, and shark by-product possibilities such as oil, hides, fins, meat, and teeth.

16. KAUFFMAN, D. E. 1950. Notes on the biology of the tiger shark (*Galeocerdo arcticus*) from Philippine waters. 10 pp.

    Data on 43 tiger sharks (*Galeocerdo arcticus*) taken on longline trawls in Philippine waters are presented. Adult sharks and unborn pups are described, weight-length and body-weight to liver-weight relations are summarized, and fecundity and size at sexual maturity are discussed. Food habits are also discussed.

17. UMALI, A. F. 1950. Guide to the classification of fishing gear in the Philippines. 165 pp.

    Contains: 1) basic classification of fishing gear, 2) key for fishing gear identification and classification of new gear, 3) definitions and illustrations of gear, 4) tabular classification of local Filipino dialect names, and 5) glossary.

18. JARVIS, N. D. 1951. Curing of fishery products. 271 pp.

    Includes information from recent technical studies of the principles on which fish curing is based, discusses improvements in methods and equipment, and describes standard methods.

19. BOURN, W. S., AND C. COTTAM. 1951. Some biological effects of ditching tidewater marshes. 30 pp.

    Presents and discusses results of studies conducted over a 12-year period, 1935–47, of the biological effects of ditching tidewater marshes in Delaware for mosquito control. Describes effects on floral cover and invertebrates.

20. HERRE, A. W. 1953. Checklist of Philippine fishes. 977 pp.

21. UMALI, A. F. 1951. Key to the families of common commercial fishes in the Philippines. 47 pp.

22. CLAGUE, J. A., AND B. DATINGALING. 1951. Fishing gear preservation for Philippine waters. 23 pp.

23. HAMM, W. S. 1951. Liver oil properties of Philippine sharks and rays. 5 pp.

    Presents and discusses results of assays of shark and ray livers for vitamin A. Other physical and chemical properties of shark oils were noted.

24. HAMM, W. S., AND J. A. CLAGUE. 1951. Temperature and salt purity effects on the manufacture of fish paste and sauce. 11 pp.

25. WARFEL, H. E., AND P. R. MANACOP. 1951. Otter trawl explorations in Philippine waters. 49 pp.

    Presents and discusses results of surveys of 24 areas using an otter trawl. Includes composition of catch and catch by depth data.

26. AVERY, A. C. 1951. Fish processing handbook for the Philippines. 149 pp.

    Covers the handling of fresh fish, various methods of preserving fish—freezing, salting, drying, smoking, canning, and miscellaneous methods such as pickling, and spoilage of fish and fish products. Gives a step-by-step description of Philippine fish-preserving methods with suggestions on improving them, and of methods used in other parts of the world which have been adapted for Philippine use.

27. CLAGUE, J. A., AND C. ALMARIO. 1951. Bacteriological studies of Philippine fishing products. 12 pp.

    To obtain information on the bacteriological quality of Philippine fishery products, tests were made on

oysters and overlying waters from oyster farms, and on fresh and processed fish and shellfish from Manila markets. Recommendations are presented for improving the bacteriological quality of fishery products.

28. WARFEL, H. E. 1951. Outlook for development of a tuna industry in the Philippines. 37 pp.

    Results of 2.5 years of study and exploration of this resource and the prospects for developing it are presented. Describes Philippine tuna species and their distribution.

29. SCHAEFER, M. B., O. E. SETTE, AND J. C. MARR. 1951. Growth of Pacific Coast pilchard fishery to 1942. 31 pp.

    Describes history, growth, and fluctuations related to economic cycles of the fishery. Describes legal regulations in British Columbia, Oregon, Washington, and California.

30. MARTIN, A. C., AND F. M. UHLER. 1951. Food of game ducks in the United States and Canada. 308 pp.

    Presents statistical index to preferred duck foods in various regions of the United States and Canada, based on analyses of nearly 8,000 stomachs or gullets of 18 duck species. Provides descriptions, illustrations, and distribution maps for 200 principal food items. Includes suggestions on propagation of waterfowl foods and development of feeding grounds. Discusses principles related to producing duck foods.

31. BUTLER, P. A. 1952. Effect of floodwaters on oysters in Mississippi Sound in 1950. 20 pp.

    Discusses the biological and hydrographic data collected during the flood period in 1950. Includes data on flood effects on salinity, water transparency, hydrogen-ion concentration, oysters, associated animals, and plankton collections.

32. SCHUCK, H. A. 1952. Offshore grounds important to the United States haddock fishery. 20 pp.

    Presents information concerning areas fished for haddock by the United States otter-trawl fleet over a 12-year period, 1938–49. A series of charts is included, showing the relative intensity of fishing over areas fished for the entire study period, and the relative intensities in each month of the year.

33. LEHMAN, B. A. 1953. Fecundity of Hudson River shad. 8 pp.

    Describes American shad (*Alosa sapidissima*) ovaries and ova counts collected from the Hudson River in April 1951. Relates fecundity with length, weight, and age.

34. JUNE, F. C., AND J. W. REINTJES. 1953. Common tuna-bait fishes of the central Pacific. 54 pp.

    Designed for practical field identification of the more common tuna-bait fishes in the central Pacific. Presented are illustrated keys to families and species, with descriptions and notes on distribution, and an evaluation of tuna-bait resources of the central Pacific region with a description of each potentially important baiting area. Provides index of scientific, English, Hawaiian, and Gilbertese names of fishes.

35. JOHNSON, H. E., AND R. F. BRICE. 1953. Use of impounded water for fish culture. 35 pp.

    Water analyses and hatchery experiments were conducted from 1950–52 to determine the suitability of impounded water for fish culture. Hatchery experiments were with chinook salmon (*Oncorhynchus tshawytscha*), silver (coho) salmon (*O. kisutch*), rainbow trout (*Salmo gairdneri*), and cutthroat trout (*S. clarki*).

36. FISH, C. J., AND M. C. COBB. 1954. Noxious marine animals of the central and western Pacific Ocean. 45 pp.

    Describes invertebrates, elasmobranchs, teleosts, and reptiles and their potential hazards to humans.

37. MOSHER, K. H., AND H. H. ECKLES. 1954. Age determination of Pacific sardines from otoliths. 40 pp.

    Otoliths and scales taken from some 500 sardines of the December 1942 San Francisco fishery were read to ascertain if the age of adult sardines can be determined from otoliths. This method was then used to determine the age composition of sardine (*Sardinops caerulea*) populations for 1932–38 with otoliths from samples of commercial catch. Data are also given for the number of sardines landed in the years covered by this study, their age composition, length composition, year-class strength, and survival.

38. WALBURG, C. H. 1955. Relative abundance of Maryland shad. 17 pp.

    Catch and effort data for American shad (*Alosa sapidissima*) during 1944–52 were used in conjunction with a tagging experiment, to estimate fishing effort, fishing rate, catch, size of run, and spawning escapement for each year.

39. BURROWS, R. E., AND H. H. CHENOWETH. 1955. Evaluation of three types of fish rearing ponds. 29 pp.

    Hydraulic investigations were conducted on three types of fish-rearing ponds: the Foster-Lucas, circular, and raceway. Models constructed on 1:10 scale effectively reproduced the hydraulic conditions found in the prototypes. Flow patterns were observed by means of floats and dyes. The degree of short circuiting, mixing, apparent detention time, and probable flowing-through time were

determined by means of dye injection in the water inflow and measurements of the time of appearance and concentration of the dye at the outflow. The four major criteria used to establish pond efficiency were carrying capacity, disease inhibition, food distribution, and facility of cleaning.

40. NELSON, P. R., AND C. E. ABEGGLEN. 1955. Survival and spawning of gill-net-marked red salmon. 19 pp.

    On Kodiak Island in Karluk Lagoon, 6,253 salmon were tagged in 1953 to determine the effect of gill-net marks on survival and spawning. Approximately half of these fish were gill-net marked and the remainder were unmarked (control) fish. Number tags of several color combinations were used so observations could be made on each group of fish both enroute to and on the spawning grounds.

41. STOLTING, W. H., M. J. GARFIELD, AND D. R. ALEXANDER. 1955. Fish and shellfish preferences of household consumers. 115 pp.

    Provides results of a nationwide survey in October 1951 of household consumers' preferences for fresh and frozen fishery products.

42. VAN OOSTEN, J., AND P. H. ESCHMEYER. 1956. Biology of young lake trout (*Salvelinus namaycush*) in Lake Michigan. 88 pp.

    Experimental fishing with gill nets of five mesh sizes (range, 2 3/8 to 3 in.) in Lake Michigan in 1930–32 yielded more than 16,000 young lake trout. Data are presented on age, growth, length–weight relations, abundance, geographical and bathymetric distribution, sex ratios, and species composition of associates of young lake trout.

43. RAYMOND, H. L. 1956. Effect of pulse frequency and duration in guiding salmon fingerlings by electricity. 19 pp.

    The relation of pulse frequency and pulse duration to the effectiveness of a moving field of pulsating direct current in directing Pacific salmon fingerlings was explored under controlled laboratory conditions, using a single-row electrode array.

44. PARKER, P. S., AND R. E. LENNON. 1956. Biology of the sea lamprey in its parasitic phase. 32 pp.

    Observations on lampreys (*Petromyzon marinus*) reared from metamorphosis to maturity were made at Hammond Bay, Michigan. Investigations were conducted on duration of parasitic phase of life, feeding, growth, and interrelations between predator and host fish.

45. LEE, C. F. 1956. Preparation of a dry product from condensed menhaden solubles. 33 pp.

    Dried solubles were prepared with a small drum dryer from 32 samples of typical condensed menhaden (*Brevoortia*) solubles obtained from plants along the coasts of the Middle and South Atlantic and the Gulf of Mexico. Chemical and physical properties were determined for both the condensed solubles and the resultant dry products. These dry products can be included in mixed farm animal feeds.

46. SYKES, J. E., AND B. A. LEHMAN. 1957. Past and present Delaware River shad fishery and considerations for its future. 25 pp.

    Describes the Delaware River and provides a history of the American shad (*Alosa sapidissima*) fishery. Discusses the distribution and migration of adult and juvenile shad, and the influence of pollution on shad abundance.

47. COPE, O. B., AND D. W. SLATER. 1957. Role of Coleman Hatchery in maintaining a king salmon run. 22 pp.

    Reports on studies at Coleman Hatchery, California, to determine how many king salmon (*Oncorhynchus tshawytscha*) entering the fisheries were released from the hatchery, and whether spring or fall immature salmon releases were more effective. Fish were captured and marked; commercial and sport catches were then examined for marked fish.

48. WALBURG, C. H., AND J. E. SYKES. 1957. Shad fishery of Chesapeake Bay with special emphasis on the fishery of Virginia. 26 pp.

    A study of American shad (*Alosa sapidissima*) in Chesapeake Bay was made in 1952. Catch and effort records were combined with data obtained from tagging studies conducted at the entrance to Chesapeake Bay, in the James and Potomac rivers, and at Cove Point, Maryland, to obtain population parameters for these areas. Total population and escapement were determined for the Potomac River for each year from 1944–51 in which these data were available.

49. DAVIS, W. S. 1957. Ova production of American shad in Atlantic Coast rivers. 5 pp.

    Ova production of American shad (*Alosa sapidissima*) was estimated on the basis of samples of five fish from each of six Atlantic Coast rivers. Ova counts were compared by location of sample.

50. WISE, J. P. 1957. Growth rate of Browns Bank haddock. 13 pp.

    Presents and discusses the results of a study of the growth rate of haddock (*Melanogrammus aeglefinus*), in which back-calculations were made from scales taken from fish ranging in age from 4 to 10 years.

51. HILE, R., AND H. J. BUETTNER. 1959. Fluctuations in the commercial fisheries of Saginaw Bay, 1885–1956. 38 pp.

Discusses total commercial production, yearly maximum and minimum catches, actual and percentage contributions of individual species to total catch, and major years of production. Interrelations of production, availability, and fishing intensity in 1929–56 are described for eight principal species. Mentions future outlook of fishery and makes recommendations.

52. VAN CAMPEN, W. G. 1960. Japanese summer fishery for albacore (*Germo alalunga*). 29 pp.

    The albacore fishery carried on by a fleet of Japanese live-bait tuna boats in spring and early summer in the northwestern Pacific is described. A historical account is given of the fishery. The magnitude of its production is compared with other Japanese albacore fisheries and with the United States west coast fishery. Seasonal trends in landings, geographical distribution of bases and fishing grounds, and marketing and use of the catch are discussed.

53. WOLF, R. S. 1961. Age composition of the Pacific sardine 1932–1960. 35 pp.

    Estimates of the age composition of commercial landings of Pacific sardine (*Sardinops caerulea*) at Monterey and San Pedro for the seasons 1938–39, 1939–40, and 1940–41 are given. A mode-subtraction method was used to make estimates for the 1938–39 season and its accuracy is discussed. Estimates for the other seasons were obtained by applying the age data collected during those seasons. All known age-composition data for the Pacific sardine for the seasons 1932–33 through 1959–60 are presented. Estimates of year-class size in numbers of fish are given by season and port of landing.

54. BULKLEY, R. V. 1961. Fluctuations in age composition and growth rate of cutthroat trout in Yellowstone Lake. 31 pp.

    Age composition, growth rate, and year-class strength of Yellowstone Lake cutthroat trout (*Salmo clarki lewisi*) from collections made in 1948 and from 1950 to 1959 are analyzed to relate total catch to changes in age composition and growth rate.

55. BALL, O. P., AND O. B. COPE. 1961. Mortality studies on cutthroad trout in Yellowstone Lake. 62 pp.

    In a study of Yellowstone Lake cutthroat trout (*Salmo clarki lewisi*), effects of environment on mortality of eggs, immature fish, spawners, and post-spawners were measured for various components of the population in Yellowstone Lake (Wyoming). Five methods for estimating mortality of adults on spawning runs are described, with counting and tagging as the principal procedures. Migrations of adult fish in Yellowstone Lake were traced through tagging.

56. BENSON, N. G. 1961. Limnology of Yellowstone Lake in relation to th cutthroat trout. 33 pp.

    Limnological data collected from 1954 to 1959 on surface currents, bottom currents, temperatures, bottom soils, water chemistry, plankton, bottom fauna, and higher aquatic plants are related to the biology of the Yellowstone Lake cutthroat trout (*Salmo clarki lewisi*) in Yellowstone Lake (Wyoming).

57. SHELL, E. W. 1961. Chemical composition of blood of smallmouth bass. 36 pp.

    Concentrations of 16 organic and inorganic components of the blood and serum of smallmouth bass (*Micropterus dolomieui*) were measured every 3 to 4 weeks from 24 June to 18 November 1958. Components measured included proteins, nonprotein nitrogen fractions, phosphorus fractions, electrolytes, and cholesterol in serum; and glucose, creatinine, and iron in blood. A scheme of homone–homore antagonism is proposed to account for the cyclic nature of the concentration curves.

58. MOUNT, D. I. 1962. Chronic effects of endrin on bluntnose minnows and guppies. 38 pp.

    Lethal and sublethal concentrations of endrin were determined for bluntnose minnows (*Pimephales notatus*) and guppies (*Poecilia reticulata*). The signs described indicated that endrin affects the central nervous system. The 96-hour TL_m values were determined for different sizes of fish by continuous-flow acute-toxicity tests. The effects of endrin on oxygen consumption were noted, and endrin concentrations in common carp (*Cyprinus carpio*) tissues were studied.

59. BULKLEY, R. V., AND N. G. BENSON. 1962. Predicting year-class abundance of Yellowstone Lake cutthroat trout. 21 pp.

    Fluctuations in strength of year classes from 1945 to 1956 of Yellowstone Lake cutthroat trout (*Salmo clarki lewisi*) from Pelican and Chipmunk Creeks are compared with parental stock and several climatically influenced factors of the environment, including water levels and air temperatures. A formula based on water levels is presented for predicting year-class strength in Pelican Creek and in the Fishing Bridge area fishery. A method of forecasting lake water levels several months in advance of their occurrence is discussed.

60. MACIOLEK, J. A. 1962. Limnological organic analyses by quantitative dichromate oxidation. 61 pp.

    A limnological oxidation technique, based on procedures employed in soil chemistry, was developed and tested by use of purified organic compounds and various natural substrates. The technique is described and evaluated.

61. CLEMENS, H. P., AND K. E. SNEED. 1962. Bioassay and use of pituitary materials to spawn warm-water fishes. 30 pp.

    By bioassay, evaluation was made of the activity and relative potency of pituitaries collected throughout the year from various species of fish. Goldfish, zebra fish, and channel catfish were the chief test species; carp, green sunfish, largemouth bass, white crappie, and flathead catfish were used occasionally. Positive response was indicated by ovulation of eggs or by increase in seminal plasma.

62. BENSON, N. G., AND R. V. BULKLEY. 1963. Equilibrium yield and management of cutthroat trout in Yellowstone Lake. 44 pp.

    Equilibrium yield of Yellowstone Lake cutthroat trout, *Salmo clarki lewisi*, in Yellowstone Lake, Wyoming, is determined from data on catch and spawning runs from 1945 to 1961. Changes in growth rate, spawning runs, mortality rates, and year-class strength are related to differences in total catch. Three stages of exploitation of the stock are defined, and the maximum safe catch or equilibrium yield is estimated. Management of the sport fishery according to equilibrium yield is discussed with reference to regulations, distribution of fishing pressure, planting, and interspecific competition.

63. CLARK, J. R., AND R. L. CLARK, EDITORS. 1964. Sea-water systems for experimental aquariums; a collection of papers. 190 pp.

    Presents a wide range of papers providing information on design, construction, and operation of experimental aquarium facilities. Discusses geography, environment, and systems. Includes a comprehensive index.

64. ALLISON, D., B. J. KALLMAN, O. B. COPE, AND C. VAN VALIN. 1964. Some chronic effects of DDT on cutthroat trout. 30 pp.

    The effects on Yellowstone Lake cutthroat trout (*Salmo clarki lewisi*) of periodic exposure to different levels of DDT in bath and in food were determined over a 20-month period involving one spawning cycle. Changes in mortality, growth rate, and reproductive potential were studied.

65. COPE, O. B. 1964. Revised bibliography on the cutthroat trout. 43 pp.

    Presents 221 abstracts of publications on the biology, culture, distribution, and management of the cutthroat trout (*Salmo clarki lewisi*).

66. BURROWS, R. E. 1964. Effects of accumulated excretory products on hatchery-reared salmonids. 12 pp.

    Studies were conducted to determine excretory products of significance in rearing ponds and possible effect of these products on fingerling chinook salmon (*Oncorhynchus tshawytscha*). Varying toxicity of ammonia solutions were correlated with pH, water temperature, and pond type.

67. THOMAS, A. E., R. E. BURROWS, AND H. H. CHENOWETH. 1964. A device for stamina measurement of fingerling salmonids. 15 pp.

    A stamina tunnel was developed to measure differences in physical performance of salmonid fingerlings. By subjecting fish samples to controlled patterns of water velocity, it has proved possible to demonstrate differences in fish stamina imparted by disease, nutrition, and environment.

68. JENKINS, R. M. 1965. Bibliography on reservoir fishery biology in North America. 57 pp.

    Subject headings are age and growth, bibliographies, diseases and parasites, food habits, harvest rates, life history and ecology, biological limnology, physicochemical limnology, management technique evaluation, methodology and technique development, population dynamics, summaries of management and research, comprehensive or general fishery surveys, and systematics and distribution.

69. WALBURG, C. H., AND W. R. NELSON. 1966. Carp, river carpsucker, smallmouth buffalo, and bigmouth buffalo in Lewis and Clark Lake, Missouri River. 30 pp.

    Studies of age composition, growth, length–weight relation, reproduction, year-class strength, and food habits were conducted from 1962 to 1964 on common carp (*Cyprinus carpio*), river carpsucker (*Carpiodes carpio*), smallmouth buffalo (*Ictiobus bubalus*), and bigmouth buffalo (*I. cyprinellus*) in Lewis and Clark Lake, a main stem Missouri River reservoir impounded in July 1955.

70. HALVER, J. E., AND I. A. MITCHELL, EDITORS. 1967. Trout hepatoma research conference papers. 199 pp.

    Reviews the status of rainbow trout (*Salmo gairdneri*) hepatoma, relates discussions at the conference between major active research groups, and projects future research programs.

71. BENSON, N. G. 1968. Review of fishery studies on Missouri River main stem reservoirs. 61 pp.

    The six main stem Missouri River reservoirs are described, and information available through 1964 on plankton, water chemistry, fish populations, and water management is discussed. Available information on growth rates, year-class strength, and relative abundance of common species is described. Research needs and problems relative to fish production are discussed.

72. HUNN, J. B. 1967. Bibliography on the blood chemistry of fishes. 32 pp.

73. HOBSON, E. S. 1968. Predatory behavior of some shore fishes in the Gulf of California. 92 pp.

    Predatory behavior in some Gulf of California shore fishes was studied to define certain general activity patterns. Between 1962 and 1965 over 1,200 hours of underwater observations were made at all hours of day and night. Predatory activity in 46 species was observed, and supplemental data were obtained on many others. Digestive-tract contents from 716 specimens were analyzed.

74. APPLEGATE, R. L., AND J. W. MULLAN. 1969. Ecology of daphnia in Bull Shoals Reservoir. 23 pp.

    Life histories of *Daphnia galeata mendotae, D. retrocurva, D. parvula, D. ambigua,* and *D. schodleri* are compared with year-class strength and food of threadfin shad (*Dorosoma petenense*) in Bull Shoals Reservoir from 1965 to 1967.

75. SMITH, W. G., AND M. P. FAHAY. 1970. Description of eggs and larvae of the summer flounder, *Paralichthys dentatus*. 21 pp.

    Summer flounder eggs and larvae are described from artificially fertilized specimens and from material collected at sea.

76. EVANS, D. H., AND P. G. WARES. 1972. Food habits of striped marlin and sailfish off Mexico and southern California. 10 pp.

    Stomach contents of 924 striped marlin (*Tetrapturus audax*) landed in sport catches at Mazatlán, Sinaloa, and Buena Vista, Baja California Sur, Mexico; and San Diego, California; and of 197 sailfish (*Istiophorus platypterus*) from Mazatlán and Buena Vista were examined and described.

77. EDMUNDS, P. H. 1972. Genic polymorphism of blood proteins from white marlin. 15 pp.

    Over 100 white marlin (*Tetrapturus albidus*) were analyzed for each of seven proteins to discover genetically controlled variations that may be useful in subpopulation studies.

78. WELLS, L., AND R. HOUSE. 1974. Life history of the spottail shiner (*Notropis hudsonius*) in southeastern Lake Michigan, the Kalamazoo River, and western Lake Erie. 10 pp.

    Discusses age structure of populations, growth, weight, length, maturity, spawning season, and reproductive potential.

79. WALBURG, C. H. 1976. Changes in the fish population of Lewis and Clark Lake, 1956–74, and their relation to water management and the environment. 34 pp.

    Discusses the effects of impoundment, water levels, water exchange times, shoreline erosion, and silt deposition on fish populations. Suggests improved management methods.

80. BENSON, N. G. 1980. Effects of post-impoundment shore modifications on fish populations in Missouri River reservoirs. 32 pp.

    Describes post-impoundment shore modifications. including decreasing shore-length, bank-cutting, and sediment deposition, and shoreline vegetation changes. Lists fish species affected by these changes and discusses how they are affected.

Special Scientific Report—Wildlife

The *Special Scientific Report—Wildlife* series contains technical reports about various species of wildlife and related topics such as pesticide effects. Typical subjects include advances in knowledge arising as by-products of broader studies; status, progress, or data reports; surveys, description of equipment, gear, and techniques; proceedings of technical conferences; and technical bibliographies. Data are included in tabular and graphic form. Publications are usually typeset and have a standard size of 20 × 26 cm (7 7/8 × 10 1/4 in.); length varies. Intended audiences are research scientists and technically trained management personnel. First issued in 1949, the series merged with the *Technical Paper* series in 1985 and was renamed *Fish and Wildlife Technical Report.*

1. ALDRICH, J. W., ET AL. 1949. Migration of some North American waterfowl: a progress report on an analysis of banding records. 49 pp.

   Migration information is presented by species. Maps are included.

2. CRISSEY, W. F., ET AL. 1949. Waterfowl populations and breeding conditions—summer 1949: with notes on woodcock and wilson snipe. 242 pp.

   Presents results of waterfowl breeding ground surveys in Canada and the United States. Includes reports on American woodcock (*Scolopax minor*) and common snipe (*Gallinago gallinago*) studies.

3. ADAMS, L. 1950. A punch-card system suitable for use with small samples in wildlife management and research. 7 pp.

   Punch card system is described and compared with Hollerith punch card systems.

4. SCHEFFER, V. B. 1950. Experiments in the marking of seals and sea lions. 33 pp.

   Reviews marking experiments of seals, sea lions, and fur seals. Discusses results of certain northern fur seal (*Callorhinus ursinus*) studies.

5. SAUNDERS, G. B., A. D. HOLLOWAY, AND C. O. HANDLEY, JR. 1950. A fish and wildlife survey of Guatemala. 162 pp.

   Catalogs game birds and shorebirds and provides general comments on hunting, game laws, and geographical regions and their game birds. Reports on stream and lake surveys and makes recommendations for the development of fishery resources. Presents a systematic list of mammals and a key for their identification.

6. AUSTIN, O. L., JR., AND F. WILKE. 1950. Japanese fur sealing. 91 pp.

   Assembles available data on distribution, abundance, and ecology of northern fur seals (*Callorhinus ursinus*) in Japanese waters, with special reference to the species' importance in Japanese economy. Attempts to clarify issues involved with fur sealing.

7. STEENIS, J. H. 1950. Waterfowl habitat management in the Tennessee Valley. 14 pp.

   Discusses opportunities and limitations of waterfowl habitat management and coordination of management with malaria control operations. Describes developing subimpoundments, controlling erosion, and planting aquatics.

8. WILLIAMS, C. S., ET AL. 1951. Waterfowl populations and breeding conditions—summer 1950, with notes on woodcock and wilson's snipe. 256 pp.

   Updates and revises *Special Scientific Report—Wildlife* 2 (1949).

9. LINDUSKA, J. P., AND P. F. SPRINGER. 1951. Chronic toxicity of some new insecticides to bobwhite quail. 6 pp.

   Presents and discusses results of toxicity studies on northern bobwhite (*Colinus virginianus*). Compounds tested were chlordane, toxaphene, DDT, benzene hexachloride, methoxychlor, TDE (Rhothane), and parathion.

10. SPRINGER, P. F., AND J. R. WEBSTER. 1951. Effects of DDT on saltmarsh wildlife: 1949. 26 pp.

    Briefly describes DDT experimental spraying program, wildlife species studied, the marsh, and tidal movements. Discusses resulting effects of DDT on vertebrates and invertebrates.

11. ROBINSON, W. B., AND M. W. CUMMINGS. 1951. Movements of coyotes from and to Yellowstone National Park. 17 pp.

Presents and discusses results of a 5-year coyote tagging study to determine migratory habits of coyotes in Yellowstone National Park.

12. KENYON, K. W., V. B. SCHEFFER, AND D. G. CHAPMAN. 1954. A population study of the Alaska fur seal herd. 77 pp.

    Suggests the present average size of the Pribilof (Alaska) northern fur seal (*Callorhinus ursinus*) herd, briefly traces its fluctuations in the past, and describes the population estimation methods used: 1) tag recovery data, 2) commercial harvest trends, and 3) harem bull count trends.

13. CRISSEY, W. F., ET AL. 1952. Waterfowl populations and breeding conditions—summer 1951. 240 pp.

    Updates and revises *Special Scientific Report—Wildlife* 8 (1949). Excludes studies on American woodcock (*Scolopax minor*) and common snipe (*Gallinago gallinago*).

14. ALDRICH, J. W., ET AL. 1952. Investigations of woodcock, snipe and rails in 1951. 58 pp.

    Discusses studies, including breeding ground surveys, of American woodcock (*Scolopax minor*), common snipe (*Gallinago gallinago*), and rails.

15. HICKEY, J. J. 1952. Survival studies of banded birds. 177 pp.

    Discusses anatomy and basis of life tables, and the characteristics of and difficulties in constructing avian life tables. Presents and discusses results of explorations in population dynamics of representative North American birds: double-crested cormorant (*Phalacrocorax auritus*), black-crowned night-heron (*Nycticorax nycticorax*), mallard (*Anas platyrhynchos*), redhead (*Aythya americana*), northern harrier (*Circus cyaneus*), Caspian tern (*Sterna caspia*), mourning dove (*Zenaida macroura*), common barn-owl (*Tyto alba*), great horned owl (*Bubo virginianus*), and blue jay (*Cyanocitta cristata*). Provides implications of mortality in reference to mallards.

16. EVANS, C. D., A. S. HAWKINS, AND W. H. MARSHALL. 1952. Movements of waterfowl broods in Manitoba. 65 pp.

    Investigates the following questions: 1) brood movements, 2) brood preferences regarding water areas, 3) brood mortality and dispersion, 4) pothole preferences of breeding adults, 5) evaluation of productivity (number of young per pair of breeding adults), and 6) classification of water areas. The study was performed in the pothole region.

17. FOOTE, L. E., AND H. S. PETERS. 1952. Investigations of methods of appraising the abundance of mourning doves. 53 pp.

    Presents and discusses results of five studies: 1) an intensive study of the call count as a census method for mourning doves (*Zenaida macroura*) on the Georgia Piedmont, 2) the call-road count as an index to breeding populations, 3) investigations of methods of determining abundance of breeding mourning doves in certain eastern States, 4) a summary of mourning dove call count investigations in Ohio, and 5) preliminary investigations on mourning dove index and survey methods in Wisconsin.

18. ALDRICH, J. W., ET AL. 1953. Investigations of woodcock, snipe, and rails in 1952. 55 pp.

    Updates and revises *Special Scientific Report—Wildlife* 14 (1952).

19. ADDY, C. E. 1953. Fall migration of the black duck. 95 pp.

    Presents results of the American black duck (*Anas rubripes*) banding throughout North America. Attempts to show where birds of important hunting areas, such as Barnegat Bay and St. Clair Flats, come from. Considers when various groups of birds move and when they may be expected to arrive from the North under present conditions.

20. MARTIN, A. C., N. HOTCHKISS, F. M. UHLER, AND W. S. BOURN. 1953. Classification of wetlands of the United States. 14 pp.

    Outlines value, classification, description, and evaluation of wetlands.

21. U.S. FISH AND WILDLIFE SERVICE. 1953. Waterfowl populations and breeding conditions—summer 1952. 303 pp.

    Updates and revises *Special Scientific Report—Wildlife* 13 (1952).

22. WILLIAMS, C. S. 1953. 1953 status report of waterfowl. 64 pp.

    Includes results of three surveys: 1) nationwide hunting season kill survey, 2) continental wintering population survey, and 3) breeding population-production survey of Canada and the United States.

23. SCIPLE, G. W. 1953. Avian botulism: information on earlier research. 12 pp.

    Summarizes avian botulism studies up to 1950.

24. ALDRICH, J. W., ET AL. 1954. Investigations of woodcock, snipe, and rails in 1953. 68 pp.

    Updates and revises *Special Scientific Report—Wildlife* 18 (1952).

25. U.S. FISH AND WILDLIFE SERVICE. 1954. Waterfowl populations and breeding conditions—summer 1953. 250 pp.

    Updates and revises *Special Scientific Report—Wildlife* 21 (1952).

26. CRISSEY, W. F. 1954. 1954 Status report of waterfowl. 97 pp.

Updates and revises *Special Scientific Report—Wildlife* 22 (1953).

27. U.S. FISH AND WILDLIFE SERVICE. 1955. Waterfowl populations and breeding conditions—summer 1954. 288 pp.

    Updates and revises *Special Scientific Report—Wildlife* 25 (1952).

28. U.S. FISH AND WILDLIFE SERVICE. 1955. Investigations of woodcock, snipe, and rails in 1954. 62 pp.

    Updates and revises *Special Scientific Report—Wildlife* 24 (1952). Includes wintering-ground studies.

29. CRISSEY, W. F. 1955. 1955 status report of waterfowl. 105 pp.

    Updates and revises *Special Scientific Report—Wildlife* 26 (1953).

30. U.S. FISH AND WILDLIFE SERVICE. 1956. Waterfowl populations and breeding conditions—summer 1955. 267 pp.

    Updates and revises *Special Scientific Report—Wildlife* 25 (1952).

31. U.S. FISH AND WILDLIFE SERVICE. 1956. Investigations of woodcock, snipe, and rails in 1955. 54 pp.

    Revises and updates *Special Scientific Report—Wildlife* 28 (1952).

32. EVANS, C. D., AND K. E. BLACK. 1956. Duck production studies on the prairie potholes of South Dakota. 59 pp.

    Presents and discusses results of a study in South Dakota that considers the value of pothole country to ducks, the relative values of various pothole types, and the effect of the pothole drainage program on ducks. Includes data on duck populations, pothole use, breeding season mobility, and habitat use.

33. CRISSEY, W. F. 1956. 1956 Status report of waterfowl. 110 pp.

    Updates and revises *Special Scientific Report—Wildlife* 29 (1954).

34. U.S. FISH AND WILDLIFE SERVICE. 1957. Investigations of woodcock, snipe, and rails in 1956. 85 pp.

    Updates and revises *Special Scientific Report—Wildlife* 31 (1952).

35. NICHOLSON, A. J. 1957. Summary of sportsmen's expenditures, Missouri River basin. 15 pp.

    Summarizes results of previous surveys of the average daily expenditure of fishermen or hunters in specific areas.

36. LOW, S. H. 1957. Waterfowl banding in the Canadian Prairie Provinces. 30 pp.

    Presents and discusses results of Canadian bird-banding and recoveries from 1954 to 1956.

37. CRISSEY, W. F. 1957. 1957 Status report of waterfowl. 122 pp.

    Updates and revises *Special Scientific Report—Wildlife* 33 (1954).

38. KENYON, K. W., D. W. RICE, C. S. ROBBINS, AND J. W. ALDRICH. 1958. Birds and aircraft on the Midway Islands, November 1956–June 1957 investigations. 51 pp.

    Examines bird hazard to aircraft on Midway Islands and investigates population dynamics and habits of species involved. Tests control methods. Primary species discussed are Laysan albatross (*Diomedea immutabilis*), black-footed albatross (*D. nigripes*), and sooty tern (*Sterna fuscata*).

39. BUMP, G. 1958. Red-legged partridges of Spain. 38 pp.

    Considers red-legged partridges (*Alectoris rufa hispanica*) and (*A. r. intercedens*) for possible introduction into the United States. Describes partridges, their distribution and abundance in Spain, habitat, food and water, general habits, and precipitation and temperature tolerances. Discusses predation, parasites, diseases, usefulness, relation to agriculture and competition with other game species. Presents handling techniques.

40. CRISSEY, W. F. 1958. 1958 Status report of waterfowl. 133 pp.

    Updates and revises *Special Scientific Report—Wildlife* 37 (1954).

41. BUCKLEY, J. L. 1958. The pacific walrus. 29 pp.

    Describes the Pacific walrus (*Odobenus rosmarus divergens*), its migrations, habitat, food habits, population dynamics, population status, age determination, and growth. Discusses value, harvest, waste, and management of walrus. Suggests future research needs.

42. KIEL, W. H., JR. 1959. Mourning dove management units, a progress report. 24 pp.

    Tentative mourning dove management units for the United States are outlined on the basis of an analysis of bandings during the 1953–57 period.

43. KLEIN, D. R. 1959. Saint Matthew Island reindeer-range study. 48 pp.

    Presents and discusses results of reindeer-range relations on St. Matthew Island in the Bering Sea. Includes data on physical condition of reindeer and winter and summer range use.

44. RICE, D. W. 1959. Birds and aircraft on Midway Islands 1957–1958 investigations. 49 pp.

    Describes hazards to aircraft at Midway Atoll in 1957–58 caused by Laysan albatross (*Diomedea immutabilis*), black-footed albatross (*D. nigripes*), and sooty tern (*Sterna fuscata*). Discusses control methods, including destroying birds and their eggs, leveling and clearing land to eliminate updrafts, and shooting and harassing birds. The Midway Islands include a very substantial portion of the world's albatross breeding grounds.

45. CRISSEY, W. F. 1959. 1959 Status report of waterfowl. 169 pp.

    Updates and revises *Special Scientific Report—Wildlife* 26 (1954).

46. [Not issued]

47. WARD, A. L., AND R. M. HANSEN. 1960. The burrow-builder and its use for control of pocket gophers. 7 pp.

    Describes the "burrow builder"—a piece of equipment which, when attached to a tractor, constructs artificial gopher runways at controlled depths below the surface of the ground and mechanically places bait in the runways. Discusses tests of burrow builders in Colorado for control of Eastern (plains) pocket gophers (*Geomys bursarius*) and Western (mountain) pocket gophers (*Thomomys talpoides*). Presents possible applications.

48. KENYON, K. W., AND D. L. SPENCER. 1960. Sea otter population and transplant studies in Alaska, 1959. 29 pp.

    Presents and evaluates results of an aerial survey of sea otters (*Enhydra lutris*) in the western Aleutian Islands in 1959. Estimates sea otter population in Alaska. Discusses past, present, and future sea otter transplants from Amchitka to the Pribilof Islands.

49. KIEL, W. H., JR. 1960. Mourning dove status report—1960. 34 pp.

    An index to the 1960 mourning dove breeding population was obtained by a call-count survey conducted throughout the United States. Trends in the breeding-population index are calculated for three management units and for hunting and nonhunting States within management units.

50. ROBBINS, C. S. 1960. Woodcock status report, 1960. 26 pp.

    Compares singing ground-counts of American woodcock (*Scolopax minor*) for 1959 and 1960. Information is for areas east of Wisconsin and north of Tennessee and South Carolina.

51. CRISSEY, W. F. 1960. Waterfowl status report, 1960. 192 pp.

    Updates and revises *Special Scientific Report—Wildlife* 26 (1954).

52. ATWOOD, E. L., AND C. F. WELLS, JR. 1960. Waterfowl harvest in the United States during the 1959–60 hunting season. 25 pp.

    Presents results of a survey of hunters regarding amount of hunting done and number of ducks shot. This information was previously included in annual waterfowl status reports.

53. GREENHALL, A. M., AND G. STELL. 1960. Bionomics and chemical control of free-tailed house bats (*Molossus*) in Trinidad. 20 pp.

    Evaluates previous studies on control methods. Discusses distribution, species, and abundance of bats, sex ratios, breeding cycles, and behavioral observations. Describes population assessment methods. Presents and discusses results of chemical control experiment.

54. GEIS, A. D., AND S. M. CARNEY. 1961. Results of duck-wing collection in the Mississippi Flyway, 1959–60. 120 pp.

    Presents results of a new (1959) method for collecting information on age, sex, and species composition of waterfowl kill, in which duck hunters mailed in wings of ducks they bagged.

55. ATWOOD, E. L., AND C. F. WELLS, JR., COMPILER. 1961. Waterfowl harvest in the United States during the 1960–61 hunting season. 20 pp.

    Updates and revises *Special Scientific Report—Wildlife* 52 (1960).

56. ATWOOD, E. L., AND C. F. WELLS, JR. 1961. Waterfowl harvest in the Mississippi Flyway States during the 1960–61 hunting season. 49 pp.

    Updates and revises *Special Scientific Report—Wildlife* 52 (1960) for Mississippi Flyway States only.

57. KIEL, W. H., JR., COMPILER. 1961. Mourning dove status report, 1961. 34 pp.

    Updates and revises *Special Scientific Report—Wildlife* 49 (1960).

58. MARTIN, F. W. 1961. Woodcock status report, 1961. 29 pp.

    Updates and revises *Special Scientific Report—Wildlife* 50 (1960). Discusses factors affecting reliability of singing ground survey.

59. KACZYNSKI, C. F., AND A. D. GEIS. 1961. Wood duck banding program, progress report, 1959 and 1960. 41 pp.

    Discusses uses and limitations of data generated by the wood duck (*Aix sponsa*) banding program initiated in the Mississippi Flyway in 1959. Reports geographical distributions of recoveries. Data are

examined for changes in recovery rates between years, for regional differences in recovery rates associated with opening dates of hunting season, and for differences in recovery rates between age groups.

60. SMITH, R. I., AND A. D. GEIS. 1961. Pre-hunting-season banding of mallards and black ducks progress report, 1959 and 1960. 29 pp.

    Summarizes progress made in the pre-hunting season mallard (*Anas platyrhynchos*) and American black duck (*A. rubripes*) banding program and discusses factors influencing effectiveness of preseason banding. Data from the Mail Questionnaire Survey and the Wing Collection Survey are used to estimate size, age composition, and harvest rate of preseason mallard populations of the Mississippi Flyway.

61. CRISSEY, W. F. 1961. Waterfowl status report, 1961. 122 pp.

    Updates and revises *Special Scientific Report—Wildlife* 51 (1960). Includes wing collection survey data.

62. BUMP, G., AND W. H. BOHL. 1961. Red junglefowl and kalij pheasants. 41 pp.

    Considers red junglefowl (*Gallus gallus*) and kalij pheasants (*Lophura leucomelana*) for introduction into the United States. Describes the birds, their taxonomy and distribution, habitat and cover preferences, climatic comparisons, food and water, and general habits. Discusses predation, reproductive capacity, diseases and parasites, bird usefulness, competition, relation to agriculture, and breeding and raising.

63. BOEKER, E. L., AND J. W. ALDRICH. 1961. Study of experimental sandhill crane hunting season in New Mexico during January 1961. 24 pp.

    Presents results of first sandhill crane (*Grus canadensis*) open hunting season in January 1961 in New Mexico. Describes pre- and post-season populations. Provides weights, measurements, sex and age ratios, and food eaten of cranes that were through checking stations.

64. HARRIS, V. T., AND F. WEBERT. 1962. Nutria feeding activity and its effect on marsh vegetation in southwestern Louisiana. 53 pp.

    The effect of nutrias (*Myocastor coypus*) on marsh vegetation was studied in southwestern Louisiana from 1954 to 1956 by means of plant transects, exclosures, and indices to nutria abundance. Plants studied included saltmeadow cordgrass, Olney's three-square, big cordgrass, reed, and sawgrass.

65. STEWART, R. E. 1962. Waterfowl populations in the Upper Chesapeake region. 208 pp.

    Presents information on distribution, ecology, and harvest of waterfowl in the Chesapeake Bay region. Provides species accounts of many waterfowl species and discusses waterfowl habitats and biogeographical sections of the Upper Chesapeake region.

66. NELSON, H. K. 1962. Recent approaches to Canada goose management. 25 pp.

    Discusses classification, range, and population trends of Canada geese (*Branta canadensis*). Describes management procedures, methods for obtaining cumulative kill, harvest quota system, and a modification of the quota system for the eastern prairie population. Suggests future management and research needs.

67. CRAWFORD, R. D., ET AL. 1962. Some recent findings in the inhibition of avian reproductivity. 97 pp.

    Presents six papers on recent findings in the inhibition of: 1) avian sperm sustenance, 2) avian ova sustenance, 3) avian embryogenesis, 4) avian oogenesis, 5) avian spermatogenesis, and 6) avian embryo sustenance.

68. SMITH, J. D. 1962. Waterfowl status report, 1962. 127 pp.

    Revises and updates *Special Scientific Report—Wildlife* 61 (1961).

69. MARTIN, F. W. 1962. Woodcock status report, 1962. 36 pp.

    Revises and updates *Special Scientific Report—Wildlife* 50 (1960).

70. WIGHT, H. M. 1962. Mourning dove status report, 1962. 33 pp.

    Revises and updates *Special Scientific Report—Wildlife* 49 (1960).

71. GREEN, W. E. 1963. Waterfowl utilization and hunting kill 1946 through 1960, Upper Mississippi River Wildlife and Fish Refuge and Mark Twain National Wildlife Refuge. 62 pp.

    A 15-year study was made of hunter use of waterfowl on the Upper Mississippi River, and of the effects of management practices, open and closed areas, seasons, and bag limits on waterfowl harvest. Describes hunting conditions, public hunting areas, closed areas, hunting pressure since 1953, species composition of the bag, and comparative hunter success.

72. GREEN, W. E., H. K. NELSON, AND C. W. LEMKE. 1963. Methods for determining cumulative goose kill on special areas. 43 pp.

    Describes area ground surveys and mailed questionnaires as methods for determining cumulative goose kill. Suggests adaptation of Horicon kill survey plan for use on other areas.

73. WIGHT, H. M., AND E. B. BAYSINGER. 1963. Mourning dove status report, 1963. 34 pp.

Updates and revises *Special Scientific Report—Wildlife* 49 (1960). Includes 1962 and 1963 call-count surveys from Canada.

74. DAVEY, S. P. 1963. Effects of chemicals on earthworms: a review of the literature. 20 pp.

75. GLOVER, F. A., AND J. D. SMITH. 1963. Waterfowl status report, 1963. 178 pp.

    Updates and revises *Special Scientific Report—Wildlife* 61 to fit specified year.

76. MARTIN, F. W. 1963. Woodcock status report, 1963. 43 pp.

    Updates and revises *Special Scientific Report—Wildlife* 50 (1960).

77. MITCHELL, R. T. 1963. The floodlight trap: a device for capturing large numbers of blackbirds and starlings at roosts. 14 pp.

    MITCHELLL, R. T. 1963. Assembly and operation of the floodlight trap. 7 pp.

    Describes floodlight trap and its development and gives results of experimental trappings.

78. GODIN, A. J. 1964. A review of the literature on the mountain beaver. 52 pp.

    Summarizes available knowledge (1964) of mountain beaver (*Aplodontia rufa*). Type localities and ranges of seven races are listed.

79. PHILLIPS, R. C. 1964. Comprehensive bibliography of *Zostera marina*. 35 pp.

    A bibliography of eelgrass (*Zostera marina*).

80. BUMP, G., AND W. H. BOHL. 1964. Summary of foreign game bird propagation and liberations, 1960–1963. 48 pp.

    State reports covering propagation and trial liberation of foreign game birds are summarized for 1960 through 1963. Details are provided in tabular form.

81. BUMP, G., AND J. W. BUMP. 1964. A study and review of the black francolin and the gray francolin. 86 pp.

    Includes descriptions of northern black francolin (*Francolinus francolinus asiae*) and northern gray francolin (*F. pondicerianus interpositus*). Discusses habitat, climatic requirements, food and water, general habits, effect of predation, reproductive capacity, and diseases and parasites. Analyzes competing interests, breeding, rearing, and trapping.

82. CARNEY, S. M. 1964. Preliminary keys to waterfowl age and sex identification by means of wing plumage. 47 pp.

    Each of the most common species of ducks is discussed briefly, and a key outlining a logical order in which to examine age and sex characters is presented.

83. BOHL, W. H. 1964. A study and review of the Japanese green and the Korean ring-necked pheasants. 65 pp.

    Presents general review of taxonomy, distribution and descriptions of Japanese green pheasants (*Phasianus colchicus*) and Korean and Manchurian ring-necked pheasants (*P. c. karpowi* and *P. c. pallasi*). Discusses their habitat and cover preferences, climatic and food and water requirements, general habits, and reproductive capacity. Considers their relation to agriculture and to other game birds within their native range, evaluates their potential for trial introduction into the United States, and suggests methods for game farm propagation.

84. CHRISTENSEN, G. C., W. H. BOHL, AND G. BUMP. 1964. A study and review of the common Indian sandgrouse and the imperial sandgrouse. 71 pp.

    Includes taxonomy and distribution (Europe, Asia, Africa) of the sandgrouse family and, in particular, common Indian sandgrouse (*Pterocles exustus hindustan*) and imperial or black-bellied sandgrouse (*P. orientalis*). Topics covered include descriptions, habitats, climatic requirements, food and water, general habits, effect of predation, reproductive capacity, and diseases and parasites. Also considered are their relation to agriculture and to other game species, with notes on breeding, rearing, and trapping.

85. ROBBINS, C. S. 1966. Birds and aircraft on Midway Islands, 1959–63 investigations. 63 pp.

    Provides population estimates of laysan (*Diomedea immutabilis*) and black-footed albatrosses (*D. nigripes*), and gives data on bird strikes and damage to aircraft. Summarizes experimental control methods tested. Discusses in detail studies on terrain modification, nesting, and habitat management.

86. HANSEN, H. A. 1964. Waterfowl status report, 1964. 142 pp.

    Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

87. WIGHT, H. M., E. B. BAYSINGER, and R. E. TOMLINSON. 1964. Mourning dove status report, 1964. 38 pp.

    Updates and revises *Special Scientific Report—Wildlife* 73 (1963).

88. MARTIN, F. W. 1964. Woodcock status report, 1964. 43 pp.

    Updates and revises *Special Scientific Report—Wildlife* 50 (1960).

89. LENSINK, C. J. 1964. Distribution of recoveries from bandings of ducklings. 146 pp.

    Presents recovery distributions of 10 species of game ducks banded as flightless young on the breeding grounds. Mallard recoveries from bandings grouped by geographical region are presented

to show distribution variations attributable to region, year of banding, sex, first year versus later years of recovery, and weather. Discusses recovery rates of mallards banded as flightless young, and affects of various factors on recovery rates.

90. HANSEN, H. A., AND M. R. HUDGINS. 1965. Waterfowl status report, 1965. 110 pp.

    Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

91. TOMLINSON, R. E. 1965. Mourning dove status report, 1965. 37 pp.

    Updates and revises *Special Scientific Report—Wildlife* 73 (1963).

92. GOUDY, W. H., AND F. W. MARTIN. 1966. Woodcock status report, 1965. 43 pp.

    Updates and revises *Special Scientific Report—Wildlife* 50 (1960).

93. CHAMBERLAIN, E. B., AND C. F. KACZYNSKI. 1965. Problems in aerial surveys of waterfowl in eastern Canada. 21 pp.

    Reviews in detail American black duck (*Anas rubripes*) breeding population surveys. Presents a new method that takes phenological variations into account.

94. KREFTING, L. W., L. B. FOREST, P. C. SHELTON, AND K. T. GILBERT. 1966. Birds of Isle Royale in Lake Superior. 56 pp.

    Lists 197 bird species of Isle Royale National Park Michigan and describes bird distribution and habitats, geography, and vegetation.

95. MARTINSON, R. K., ET AL. 1966. 1965 Experimental September hunting season on teal. 36 pp.

    Presents and discusses data from 9-day teal hunting season in 20 States of Central and Mississippi Flyways. Mentions species and estimates numbers killed illegally. Suggests number of recreation days provided without adversely affecting continental population of any waterfowl species.

96. MENZIE, C. M. 1966. Metabolism of pesticides. 274 pp.

    Describes and discusses metabolism and decomposition of pesticides, listed alphabetically.

97. MEANLEY, B., AND R. T. MITCHELL. 1966. Selected bibliography on the red-winged blackbird. 12 pp.

    Lists alphabetically, by author, 128 informative references on the life history, biology, economic status, and control of the red-winged blackbird (*Agelaius phoeniceus*). A brief description is given for those reference titles that do not clearly indicate the content of the paper.

98. TALBOT, L. M. 1966. Wild animals as a source of food. 16 pp.

    Discusses the possibility of animal production under adverse climatic conditions using indigenous wild animals as livestock. Primarily concerned with semiarid tropics of East and Central Africa.

99. HANSEN, H. A., AND M. R. HUDGINS. 1966. Waterfowl status report, 1966. 96 pp.

    Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

100. MOISAN, G., R. I. SMITH, AND R. K. MARTINSON. 1967. The green-winged teal: its distribution, migration, and population dynamics. 248 pp.

    Includes information on distribution, migration, hunting kill, survival, and status of the green-winged teal (*Anas crecca*) in the Western Hemisphere.

101. GOUDY, W. H. 1967. Woodcock research and management, 1966. 40 pp.

    Summarizes survey results to evaluate changes in continental breeding populations, production, and annual harvest of American woodcock (*Scolopax minor*). Discusses singing-ground surveys, banding operations, and specifically, banding and recoveries in Moosehorn National Wildlife Refuge.

102. ROBBINS, C. S., AND W. T. VAN VELZEN. 1967. The breeding bird survey, 1966. 43 pp.

    Presents results of a breeding bird survey in 26 eastern States and four Canadian Provinces in 1966, and describes techniques used in the survey. Average number of birds per route is tabulated by State, along with total number of each species and percent of routes and stops on which they were recorded. Maps are presented showing range and abundance of selected species. Year-to-year comparison is made of populations of selected species on Maryland routes in 1965 and 1966.

103. HOUT, J. L. 1967. Contribution toward a bibliography on brant. 15 pp.

    Emphasizes references to Pacific coast populations of brant (*Branta bernicla nigricans*) but includes some references to Atlantic coast brant (*B. b. horta*) populations.

104. GUARINO, J. L., AND E. W. SCHAFER. 1967. Magpie reduction in an urban roost. 5 pp.

    Presents and discusses results of two instances of black-billed magpie (*Pica pica*) control. Poultry pellets treated with 2% 4-aminopyridine, a chemical frightening agent, were used in one instance, and pellets treated with 1% DRC (3-chloro-*p*-toluidine hydrochloride), a lethal agent, were used in the second instance. Hazards to mammals and number of treatments needed are considered.

105. MARTINSON, K., AND C. F. KACZYNSKI. 1967. Factors influencing waterfowl counts on aerial surveys, 1961–66. 78 pp.

Describes aerial survey assumptions, reviews necessity for air-ground correction, and evaluates the procedure as solution to aerial index biases. Discusses problems with the technique and recommends improvements to air-ground technique.

106. WILBUR, S. R. 1967. Live-trapping North American upland game birds. 37 pp.

Presents methods used to trap upland species, emphasizing a list of pertinent literature rather than discussing each technique in detail. Covers North American gallinaceous birds of the sub families Tetraoninae, Phasianinae, and Meleagridinae, and members of Rallidae, Scolopacidae, and Columbidae that are classified as game species.

107. GODIN, A. J. 1967. Test of grit types in alleviating lead poisoning in mallards. 9 pp.

Presents and discusses results of a study of mallards (*Anas platyrhynchos*) given 0, 2, or 4 No. 6 lead shot in combination with four grit treatments: 1) no grit, 2) coarse sand, 3) mica granite, and 4) crushed oystershell.

108. MARTINSON, R. K., AND C. J. HENNY. 1967. Retention of extra-wide, lock-on, and regular bands on waterfowl. 19 pp.

Presents test results of retention of the three types of bands.

109. STIEGLITZ, W. O., AND R. L. THOMPSON. 1967. Status and life history of the everglade kite in the United States. 21 pp.

Describes the snail (Florida everglade) kite (*Rostrhamus sociabilis*), its distribution, populations, habitat, and life history. Discusses problems and limiting factors.

110. KALMBACH, E. R. 1968. Type C botulism among wild birds—a historical sketch. 8 pp.

111. HANSEN, H. A., EDITOR. 1967. Waterfowl status report 1967. 144 pp.

Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

112. HOSLEY, N. W. 1968. Selected references on management of white-tailed deer 1910–1966. 46 pp.

Updates and includes references previously cited for white-tailed deer (*Odocoileus virginianus*). Excludes general accounts with no apparent new contribution to management, regional population data, annual kill reports, articles on diseases and parasites, and taxonomic and physiologic studies.

113. BULLER, R. J. 1967. Sandhill crane study in the Central Flyway. 17 pp.

Summarizes results of 4-year (1962–65) study designed to determine feasibility of extending the hunting of lesser sandhill cranes (*Grus canadensis*) in New Mexico and Texas to other Central Flyway States.

114. MCROY, C. P., AND R. C. PHILLIPS. 1968. Supplementary bibliography on eelgrass, *Zostera marina*. 14 pp.

Supplements earlier list, *Special Scientific Report—Wildlife* 79 (1964).

115. RUOS, J. L., AND R. E. TOMLINSON. 1968. Mourning dove status report, 1966. 49 pp.

Revises and updates *Special Scientific Report—Wildlife* 73 (1963). Presents "quality-check" study of field data.

116. BLANKENSHIP, L. H., AND R. E. TOMLINSON. 1967. Arizona dove wing survey, 1964. 34 pp.

Reports results of mourning dove (*Zenaida macroura*) and white-winged dove (*Z. asiatica*) wing survey. Presents information on age ratios in harvest, chronologic and geographic distribution of kill within Arizona, and feasibility of using wing surveys to obtain reliable age ratios and kill data.

117. REEVES, H. M., AND A. D. GEIS. 1968. Mourning dove capture and banding. 63 pp.

Consolidates information on techniques by which doves can be captured, especially during preseason and postseason banding periods. Methods include nestling capture, bait trapping, nest trapping, mist netting, cannon and rocket projection netting, and oral anesthetics. Construction plans are for the most commonly used types of bait and nest traps. Conditions under which the various capture techniques may be used are discussed. Sex and age criteria are reviewed and the new banding codes of the Bird Banding Laboratory are explained as they relate to mourning doves. A selected bibliography includes references to capture methods, banding, and sex and age determination.

118. KACZYNSKI, C. F., AND E. B. CHAMBERLAIN. 1968. Aerial surveys of Canada geese and black ducks in eastern Canada. 29 pp.

Summarizes results from aerial surveys of Canada geese (*Branta canadensis*) and American black ducks (*Anas rubripes*) in eastern Canada. Information presented is based on data obtained during the summer of 1956 and 1962–66 for Canada geese and during the spring of 1955, 1956, and 1963–66 for American black ducks.

119. STICKEL, L. F. 1968. Organochlorine pesticides in the environment. 32 pp.

Constitutes a selective review of the literature concerning the occurrence, distribution, and effects of organochlorines in the environment.

120. BUMP, G., AND J. W. BUMP. 1969. A study of the spotted tinamous and the pale spotted tinamous of Argentina. 160 pp.

Tinamous are the principal upland game birds of South America. Presents in detail the characteristics, habitat and climatic requirements, life history,

and propagation of the several species and subspecies of spotted and pale spotted tinamous for evaluating the desirability of and potential for a successful trial introduction into the United States.

121. RUOS, J. L., AND D. MACDONALD. 1968. Mourning dove status report, 1967. 23 pp.

Revises and updates *Special Scientific Report—Wildlife* 115 (1968).

122. MARTINSON, R. K., J. F. VOELZER, AND M. R. HUDGINS. 1968. Waterfowl status report, 1968. 158 pp.

Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

123. GOUDY, W. H. 1969. Woodcock research and management programs 1967 and 1968. 32 pp.

Updates and revises *Special Scientific Report—Wildlife* 101 (1967).

124. ROBBINS, C. S., AND W. T. VAN VELZEN. 1969. The breeding bird survey 1967 and 1968. 107 pp.

Updates and revises *Special Scientific Report—Wildlife* 102 (1967).

125. MCDONALD, M. E. 1969. Annotated bibliography of helminths of waterfowl (Anatidae). 333 pp.

Attempts to list all the publications dealing with helminths of waterfowl (Anatidae)—reports of their occurrence, descriptions, classification, life history, and pathological effects. It updates and revises a work published in 1965 (*Wildlife Diseases* 45). Does not include studies on prophylaxis and treatment, physiology, and general reports on poultry diseases. Publications issued before 1890 (about 120) are also omitted.

126. MCDONALD, M. E. 1969. Catalogue of helminths of waterfowl (Anatidae). 692 pp.

Revision of a catalogue published in 1965 (McDonald 1965, *Wildlife Diseases* 46, 7 microfiche, 392 pp.). Includes new material and corrections. Summarizes information available on each helminth reported as a parasite of waterfowl (Anatidae only): the names applied to it, its life history, hosts, location in the host, geographical distribution, frequency of record in waterfowl, and significance as a cause of disease.

127. MENZIE, C. M. 1969. Metabolism of pesticides. 487 pp.

Describes and discusses metabolism and decomposition of pesticides; listed alphabetically.

128. MARTINSON, R. K., J. F. VOELZER, AND S. L. MELLER. 1969. Waterfowl status report, 1969. 153 pp.

Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

129. RUOS, J. L., AND D. MACDONALD. 1970. Mourning dove status report, 1968. 38 pp.

Updates and revises *Special Scientific Report—Wildlife* 115 (1968).

130. BOHL, W. H., AND G. BUMP. 1970. Summary of foreign game bird liberations 1960 to 1968 and propagation 1966 to 1968. 61 pp.

131. BOHL, W. H. 1970. A study of the crested tinamou of Argentina. 101 pp.

Detailed discussions of crested tinamous, *Eudromia elegans elegans* and *E. e. albida*, and less detailed information about *E. e. patagonica*, include habitat preferences, climate, food and water uses, general habits and behavior, reproduction, predation, and diseases and parasites. Competition with other wildlife and economic relations of crested tinamous in their native range are analyzed and projected to conditions in regions of possible liberation in the United States. Propagation techniques and trapping methods are discussed. Considerations and recommendations for introduction of the crested tinamou as a game bird into the western United States are discussed.

132. RUOS, J. L. 1970. Mourning dove status report, 1969. 35 pp.

Updates and revises *Special Scientific Report—Wildlife* 115 (1968).

133. CLARK, E. R. 1970. Woodcock status report, 1969. 35 pp.

Updates and revises *Special Scientific Report—Wildlife* 50 (1960).

134. MORROW, T. L., AND F. A. GLOVER. [1970]. Experimental studies on post-mortem changes in mallards. 25 pp.

Post-mortem changes in mallards (*Anas platyrhynchos*) were studied to develop techniques for estimating time since death in birds killed by hunters. Body temperature, eye appearance, muscle rigor, and tracheal ciliary activity were studied.

135. BLANKENSHIP, L. H., AND H. M. REEVES. 1970. Mourning dove recoveries from Mexico. 25 pp.

Provides results of mourning dove (*Zenaida macroura*) recoveries in Mexico. Possible explanations of the heterogeneous distribution of recoveries throughout Mexico are discussed. Factors influencing band reporting rates (the proportion of banded birds taken by hunters that are reported) must be resolved before Mexico's importance as a harvest area can be accurately determined.

136. BANKS, R. C. 1970. Birds imported into the United States in 1968. 64 pp.

137. JONES, C. 1970. Mammals imported into the United States in 1968. 29 pp.

138. CHAMBERLAIN, E. B., R. K. MARTINSON, AND S. L. CLARK. 1971. Waterfowl status report, 1970. 157 pp.

Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

139. GEIS, A. D., R. I. SMITH, AND J. P. ROGERS. 1971. Black duck distribution, harvest characteristics, and survival. 241 pp.

Presents sources of information and procedures of analysis. Discusses American black duck (*Anas rubripes*) summer and winter reference areas of banding, hunting regulations, rate of hunting kill, geographic and chronologic distribution of kill, source of kill in harvest areas, mortality and production rates, sex ratios, and population estimates. Suggests management implications and future research needs.

140. CLARK, E. R. 1971. Woodcock status report, 1970. 38 pp.

Updates and revises *Special Scientific Report—Wildlife* 50 (1960).

141. RUOS, J. L. 1971. Mourning dove status report, 1970. 36 pp.

Updates and revises *Special Scientific Report—Wildlife* 115 (1968).

142. MACDONALD, D., AND E. MARTIN. 1971. Trends in harvest of migratory game birds other than waterfowl 1964–65 to 1968–69. 29 pp.

Responses to questions pertaining to harvest of migratory game birds (other than waterfowl and coots) contained in the annual mail questionnaire survey of waterfowl hunters are summarized for the hunting seasons 1964–65 through 1968–69. Analyses of these data demonstrate the weaknesses inherent in using a sampling frame based on duck stamp buyers to assess harvest and hunting of other migratory game birds.

143. PAN, H. P. 1971. Literature survey on general and comparative enzyme biochemistry of birds. 70 pp.

144. GEIS, A. D. 1971. Breeding and wintering areas of mallards harvested in various States and Provinces. 59 pp.

Band recoveries from mallards were used to estimate relative contribution of various breeding and wintering areas to harvest in each State and Province, and are presented in tables. Other sources of population data, in addition to conventional waterfowl breeding population surveys, were used resulting in larger continentwide population estimates than those previously published. Patterns of similarity or dissimilarity among States in the source of harvest are mentioned.

145. PARADISO, J. L., AND R. M. NEWAK. 1971. A report on the taxonomic status and distribution of the red wolf. 36 pp.

Includes a report of hybridization between the red wolf (*Canis rufus*) and the coyote (*C. latrans*) in Texas in 1915.

146. ATZERT, S. P. 1971. A review of sodium monofluoroacetate (compound 1080), its properties, toxicology, and use in predator and rodent control. 34 pp.

147. JONES, C., AND J. L. PARADISO. 1971. Mammals imported into the United States in 1969. 33 pp.

148. BANKS, R. C., AND R. B. CLAPP. 1972. Birds imported into the United States in 1969. 99 pp.

149. TODD, E. I., AND K. W. KENYON. 1972. Selected bibliography on the sea otter. 40 pp.

Emphasizes recent (1972) literature on the biology of the sea otter (*Enhydra lutris*).

150. SCHAFER, E. W., JR., AND D. J. CUNNINGHAM. 1972. An evaluation of 148 compounds as avian immobilizing agents. 30 pp.

From 1961 to 1969, 148 compounds were tested for immobilization of red-winged blackbirds (*Agelaius phoeniceus*) and European starlings (*Sturnus vulgaris*). Of these, 25 showed enough promise to warrant advanced testing on seven additional species of wild birds: the common grackle (*Quiscalus quiscula*), rock dove, or domestic pigeon (*Columba livia*), house finch (*Carpodacus mexicanus*), house sparrow (*Passer domesticus*), mallard (*Anas platyrhynchos*), ring-necked pheasant (*Phasianus colchicus*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*). Results are presented and discussed.

151. GEIS, A. D., AND F. G. COOCH. 1972. Distribution of the duck harvest in Canada and the United States. 11 pp.

Comparison between Canada and the United States is made on the basis of data from mail questionnaire and wing collection surveys.

152. HEATH, R. G., J. W. SPANA, E. F. HILL, AND J. F. KREITZER. 1972. Comparative dietary toxicities of pesticides to birds. 57 pp.

Presents measurements of the lethal dietary toxicity of 89 pesticidal chemicals to young northern bobwhites (*Colinus virginianus*), Japanese quail (*Coturnix japonica*), ring-necked pheasants (*Phasianus colchicus*), and mallards (*Anas platyrhynchos*).

153. CLARK, E. R. 1972. Woodcock status report, 1971. 47 pp.

Updates and revises *Special Scientific Report—Wildlife* 50 (1960).

154. GEIS, A. D. 1972. Use of banding data in migratory game bird research and management. 47 pp.

Discusses use of banding data to: 1) determine distribution and derivation of hunting kill, 2) measure rate of kill, and 3) estimate percent mortality.

155. BARNES, V. G., JR. 1973. Pocket gophers and reforestation in the Pacific Northwest: a problem analysis. 18 pp.

Reviews pocket gopher problems in the northwestern United States, summarizes present knowledge of pocket gopher biology, outlines current control methods, and suggests future research needs.

156. ANDERSON, D. R. 1972. Bibliography on methods of analyzing bird banding data with special reference to the estimation of population size and survival. 13 pp.

157. PARADISO, J. L. 1972. Status report on cats (Felidae) of the world 1971. 43 pp.

Presents evidence that the cheetah (*Acinonyx jubatus*), leopard (*Panthera pardus*), tiger (*P. tigris*), snow leopard (*P. uncia*), jaguar (*P. onca*), ocelot (*Felis pardalis*), margay (*F. wiedii*), and little spotted cat (*F. tigrinus*) are endangered. Provides annotated list of species considered not endangered.

158. RUOS, J. L. 1972. Mourning dove status report, 1971. 40 pp.

Revises and updates *Special Scientific Report—Wildlife* 115 (1968).

159. HALVORSON, C. H. 1972. Device and technique for handling red squirrels. 10 pp.

Rapid and efficient weighing, examination, and marking of red squirrels (*Tamiasciurus hudsonicus*) resulted from use of a semiflexible wire-rod handling cone and a cloth weighing bag with a plastic window. Construction details are given.

160. HENNY, C. J., D. R. ANDERSON, AND R. S. POSPAHALA. 1972. Aerial surveys of waterfowl production in North America, 1955–71. 48 pp.

Summarizes July waterfowl production survey data collected by personnel of the Bureau of Sport Fisheries and Wildlife and other cooperating agencies during 1955–71.

161. PARADISO, J. L., AND R. D. FISHER. 1972. Mammals imported into the United States in 1970. 62 pp.

162. RILEY, G. A., AND R. T. MCBRIDE. 1972. A survey of the red wolf (*Canis rufus*). 15 pp.

Discusses the red wolf's (*Canis rufus*) status, distribution, and ecology; describes and differentiates the red wolf from other closely related canids.

163. KOLZ, A. L., G. W. CORNER, AND R. E. JOHNSON. 1973. A multiple-use wildlife transmitter. 11 pp.

Describes the transmitter and its ability to monitor temperature, activity, mortality, and location.

164. CLAPP, R. B., AND R. C. BANKS. 1973. Birds imported into the United States in 1970. 102 pp.

Birds imported into the United States in 1970 are tabulated by species, and the numbers are compared with those for 1968 and 1969. Tables list imported birds by country of origin.

165. TARSHIS, B. 1973. Studies on the collection, rearing, and biology of the blackfly (*Cnephia ornithophilia*). 16 pp.

Presents and discusses results of a 5-year study (1968–72) on *Cnephia ornithophilia* at the Patuxent Wildlife Research Center, Maryland. Includes biology, ecology, collection, and rearing data.

166. CHAMBERLAIN, E. B., D. S. BENNING, E. L. FERGUSON, M. M. SMITH, AND J. L. HALL, EDITORS. 1972. Waterfowl status report, 1972. 146 pp.

Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

167. DIETER, M. P. 1973. Sex determination of eagles, owls, and herons by analyzing plasma steroid hormones. 13 pp.

Steroid hormone components from plasma of several avian species, including bald eagles (*Haliaeetus leucocephalus*), common barn-owls (*Tyto alba*), and black-crowned night-herons (*Nycticorax nycticorax*), were separated by centrifugal chromatography on silica gel columns. Sex was determined by staining steroid hormone bands with iodine, charring with sulfuric acid, and observing fluorescence under ultraviolet light.

168. COWARDIN, L. M., AND D. H. JOHNSON. 1973. A preliminary classification of wetland plant communities in north-central Minnesota. 33 pp.

A classification of wetland plant communities was developed for a study area in north-central Minnesota to analyze data on waterfowl use of habitat that were gathered by radiotelemetry. Brief descriptions are given for each community, and important plant species are listed. Discriminant function analysis was used for 40 plant species.

169. CLARK, E. R. 1973. Woodcock status report, 1972. 50 pp.

Updates and revises *Special Scientific Report—Wildlife* 50 (1960).

170. CLAPP, R. B., AND R. C. BANKS. 1973. Birds imported into the United States in 1971. 99 pp.

Updates and revises *Special Scientific Report—Wildlife* 164 (1973).

171. CLAPP, R. B., AND J. L. PARADISO. 1973. Mammals imported into the United States in 1971. 52 pp.

Mammals imported into the United States in 1971 are tabulated by species and country of origin. Total numbers imported from 1968 through 1971 are given for higher taxa and for species most frequently imported. Lists of rare and endangered

species imported and of mammals whose importation is restricted are given.

172. MOTT, D. F., AND C. P. STONE. 1973. Bird damage to blueberries in the United States. 15 pp.

Presents results of a 1972 questionnaire on bird damage to highbush blueberries. Includes data on severity of damage, bird species involved, and crop protection.

173. STONE, C. P., AND D. F. MOTT. 1973. Bird damage to sprouting corn in the United States. 28 pp.

Presents results of a questionnaire on bird damage to sprouting corn. Includes information on damage severity, bird species involved, and crop protection.

174. PANK, L. F. 1974. A bibliography on seed-eating mammals and birds that affect forest regeneration. 28 pp.

Includes references on: 1) identification of birds and mammals that consume forest-tree seed, 2) methods for reducing seed-eating animal populations, 3) methods for deterring and repelling seed-eating animals, and 4) effects of control measures on nontarget species and seed viability.

175. WILBUR, S. R. 1974. The literature of the California least tern. 18 pp.

Summarizes information contained in about 100 references to the California least tern (*Sterna antillarum*) and related subspecies. Additional records of past distribution derived from several museum collections are included.

176. RUOS, J. L. 1974. Mourning dove status report, 1972. 35 pp.

Updates and revises *Special Scientific Report—Wildlife* 115 (1968).

177. MALECKI, R. A., S. H. ALLEN, J. O. ELLISTON, K. C. SADLER, W. R. GOFORTH, AND T. S. BASKETT. 1974. Cottontail reproduction related to dieldrin exposure. 61 pp.

Wild-trapped young-of-the-year eastern cottontails (*Sylvilagus floridanus*), confined in 1-acre pens, were exposed to annual ground applications of 0.5 and 2.0 pounds of granular dieldrin per acre. Reproductive data from rabbits in treated pens were compared with control groups during six breeding seasons, 1966–1971.

178. CLARK, E. R. 1974. Woodcock status report, 1973. 43 pp.

Updates and revises *Special Scientific Report—Wildlife* 50 (1960).

179. WILBUR, S. R. 1974. The literature of the California black rail. 17 pp.

Lists and summarizes 84 papers and notes on black rail (*Laterallus jamaicensis coturniculus*), including its life history and distribution; mentions the closely related eastern black rail (*L. j. jamaicensis*).

180. SCHROEDER, L. D., S. M. CARNEY, AND E. M. MARTIN. 1974. Distribution of duck stamp sales within States during fiscal years 1962–71. 46 pp.

Summarizes duck stamp sales by county, State, flyway, and the United States.

181. CLAPP, R. B. 1974. Mammals imported into the United States in 1972. 46 pp.

Updates and revises *Special Scientific Report—Wildlife* 171 (1973).

182. LONGCORE, J. R., L. N. LOCKE, G. E. BAGLEY, AND R. ANDREWS. 1974. Significance of lead residues in mallard tissues. 24 pp.

Tissues of adult, lead-dosed mallards (*Anas platyrhynchos*) that died naturally or were sacrificed were analyzed for lead. Tissues analyzed were brain, tibia, breast muscle, heart, lung, blood, liver, and kidney.

183. LONGCORE, J. R., ET AL. 1974. Toxicity of lead and proposed substitute shot to mallards. 23 pp.

Proposed substitutes for lead shot were evaluated in a series of acute toxicity tests with pen-reared mallards (*Anas platyrhynchos*) of different ages and sexes. Mortality was compared with wild adult mallards and male American black ducks (*A. rubripes*). Effects of the presence of different types of grit in the gizzard were noted.

184. MENZIE, C. M. 1974. Metabolism of pesticides. An update. 486 pp.

Updates and supplements *Special Scientific Report—Wildlife* 127 (1969).

185. GEIS, A. D. 1974. Breeding and wintering areas of canvasbacks harvested in various States and Provinces. 78 pp.

Relations among canvasback (*Aythya valisineria*) breeding, wintering, and harvest areas were examined by analyzing banding data.

186. RUOS, J. L. 1974. Mourning dove status report, 1973. 36 pp.

Updates and revises *Special Scientific Report—Wildlife* 115 (1968).

187. CARNEY, S. M., M. F. SORENSEN, AND E. M. MARTIN. 1975. Distribution in States and counties of waterfowl species harvested during 1961–70 hunting seasons. 132 pp.

Average numbers of waterfowl harvested during 1961–70 wintering seasons are estimated, by species, for each county in the continental United States.

188. BENNING, D. S., M. M. SMITH, AND S. L. RHOADES. 1975. Waterfowl status report, 1973. 105 pp.

Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

189. ARTMANN, J. W. 1975. Woodcock status report, 1974. 39 pp.

Updates and revises *Special Scientific Report—Wildlife* 50 (1960).

190. DOUGLASS, J. F. 1975. Bibliography of the North American land tortoises (genus *Gopherus*). 60 pp.

Contains references on land tortoise behavior and ecology.

191. HILL, E. F., R. G. HEATH, J. W. SPAWN, AND J. D. WILLIAMS. 1975. Lethal dietary toxicities of environmental pollutants to birds. 61 pp.

Compiles and analyzes results of nearly 10 years of testing lethal dietary toxicities of pesticidal and industrial chemicals to young northern bobwhites (*Colinus virginianus*), Japanese quail (*Coturnix japonica*), ring-necked pheasants (*Phasianus colchicus*), and mallards (*Anas platyrhynchos*).

192. CRASE, F. T., AND R. W. DEHAVEN. 1975. Selected bibliography on the food habits of North American blackbirds. 20 pp.

Lists 261 references on the food habits of nine North American blackbird species and on such related subjects as examination techniques, seed dispersal, and sources of bias. Most references are briefly annotated.

193. CLAPP, R. B. 1975. Birds imported into the United States in 1972. 81 pp.

Updates and revises *Special Scientific Report—Wildlife* 164 (1973).

194. WILBUR, S. R., AND R. E. TOMLINSON. 1976. The literature of the western clapper rails. 31 pp.

Describes the California clapper rail (*Rallus longirostris obsoletus*), light-footed clapper rail (*R. l. levipes*), and Yuma clapper rail (*R. l. yunranensis*). Discusses discovery and nomenclature, distribution, life history and habitat, reasons for decline, and current (1976) status.

195. TIETJEN, H. P. 1976. Zinc phosphide—its development as a control agent for black-tailed prairie dogs. 14 pp.

Laboratory grain acceptance tests, LD50 determinations, and bioassays were used to test zinc phosphide as a control agent for black-tailed prairie dogs (*Cynomys ludovicianus*). Environmental contamination was measured and primary and secondary intoxication of nontarget vertebrates was considered.

196. ENGEL, J. M. 1976. The Indiana bat, *Myotis sodalis*: a bibliography. 11 pp.

Topics included are: behavior, collecting, banding and trapping, conservation, distribution and status, ecology, habitat and habitat selection, hibernation, homing, migration and seasonal movements, longevity, population decline and its causes, reproduction, and taxonomy.

197. CRASE, F. T., C. P. STONE, R. W. DEHAVEN, AND D. F. MOTT. 1976. Bird damage to grapes in the United States with emphasis on California. 18 pp.

Presents the results of a questionnaire dealing with severity of damage, species of birds involved, and methods of control.

198. COWARDIN, L. M. 1977. Analysis and machine mapping of the distribution of band recoveries. 8 pp.

Presents a method for calculating distance and bearing from banding site to recovery location on the basis of the solution of a spherical triangle. Discusses the advantages and disadvantages of tables of recoveries by State or degree block, axial lines, and distance of recovery from banding site for presentation and comparison of spatial distribution of band recoveries. Comparison of distributions by means of a chi-square contingency test is illustrated.

199. DAVENPORT, D. A. 1977. Computerized tabulation and display of band recovery data. 7 pp.

A data editing routine and five programs to tabulate band recovery data for analysis are presented with examples of each program's application.

200. BANKS, R. C. 1976. Wildlife importation into the United States, 1900–1972. 18 pp.

Data for birds and mammals are compiled for 1900–72. Information on reptiles and amphibians is only available for 1970 and 1971.

201. ARTMANN, J. W. 1977. Woodcock status report, 1975. 36 pp.

Updates and revises *Special Scientific Report—Wildlife* 50 (1960).

202. RUOS, J. L. 1977. Mourning dove status report, 1974. 26 pp.

Updates and revises *Special Scientific Report—Wildlife* 115 (1968).

203. JOHNSON, D. H. 1977. Some Bayesian statistical techniques useful in estimating frequency and density. 10 pp.

Presents some elementary applications of Bayesian statistics to problems faced by wildlife biologists. Conditions are described under which Bayesian confidence limits are superior to those calculated with classical methods; examples of how prior knowledge of population density can be used to sharpen inferences drawn from a new sample are given.

204. ALLEN, J. P., AND S. S. WILSON. 1977. A bibliography of references to avian botulism. 6 pp.

In general, only articles dealing primarily with avian disease are included, as opposed to those concerned with various aspects of the biology of *Clostridium botulinum*, either type C or type E.

205. GASHWILER, J. S. 1977. Bird populations in four vegetational types in central Oregon. 20 pp.

A long-term study of birds to obtain baseline population data in relatively undisturbed major plant types was started in Deschutes County, Oregon, in 1971. The four vegetational types studied were: 1) big sagebrush (*Artemisia tridentata*), 2) western juniper (*Juniperus occidentalis*), 3) ponderosa pine (*Pinus ponderosa*), and 4) lodgepole pine (*P. contorta*).

206. CUSTER, T. W., AND R. G. OSBORN. 1977. Wading birds as biological indicators: 1975 colony survey. 28 pp.

Wading bird colonies were located and censused along the Atlantic coast from Maine to Florida. The reproductive biology of 9 species in 13 colonies was studied; further studies are suggested.

207. RUOS, J. L., AND D. D. DOLTON. 1977. Mourning dove status report, 1975. 27 pp.

Revises and updates *Special Scientific Report—Wildlife* 115 (1968).

208. DOLTON, D. D. 1977. Mourning dove status report, 1976. 27 pp.

Updates and revises *Special Scientific Report—Wildlife* 115 (1968).

209. ARTMANN, J. W. 1977. Woodcock status report, 1976. 21 pp.

Updates and revises *Special Scientific Report—Wildlife* 50 (1960).

210. CARNEY, S. M., M. F. SORENSEN, AND E. M. MARTIN. 1978. Duck stamps sold within States and counties during sales years 1966–67 through 1975–75. 46 pp.

Summarizes duck stamp sales by county, State, flyway, and the United States.

211. BENNING, D. S., S. L. RHOADES, L.D. SCHROEDER, AND M. M. SMITH. 1978. Waterfowl status report, 1974. 98 pp.

Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

212. MENZIE, C. M. 1978. Metabolism of pesticides: update II. 381 pp.

Updates and supplements *Special Scientific Report—Wildlife* 127 and 184 (1969 and 1974, respectively).

213. DWYER, T. J., R. A. COON, AND P. H. GEISSLER. 1979. The technical literature on the American woodcock 1927–1978. 44 pp.

214. DOLBEER, R. A., AND R. A. STEHN. 1979. Population trends of blackbirds and starlings in North America, 1966–76. 99 pp.

A North American breeding bird survey was conducted to estimate population trends of red-winged blackbirds (*Agelaius phoeniceus*), common grackles (*Quiscalus quiscula*), brown-headed cowbirds (*Molothrus ater*), and starlings (*Sturnus vulgaris*) for 1966–76 in the United States and Canada.

215. BANKS, R. C. 1979. Human related mortality of birds in the United States. 16 pp.

Discusses hunting, damage control, research and propagation, collision, pollution, and poisoning as aspects of human-related mortality in birds.

216. OHLENDORF, H. M., E. E. KLAAS, AND T. E. KAISER. 1979. Environmental pollutants and eggshell thickness: anhingas and wading birds in the eastern United States. 94 pp.

Eggs of anhingas (*Anhinga anhinga*) and 17 species of wading birds (herons, egrets, bitterns, ibises, and storks) were analyzed for organochlorine residues. Shell thicknesses were compared with those of eggs collected before widespread use of organochlorine pesticides. Results were compared between different regions of the United States.

217. WILSON, S. S. 1979. A bibliography of references to avian cholera. 18 pp.

Does not include papers dealing primarily with the biology of *Pasteurella multocida* rather than its disease-inducing effects in birds.

218. MARTIN, E. M. 1979. Hunting and harvest trends for migratory game birds other than waterfowl: 1964–76. 37 pp.

Presents hunting activity and harvest estimates for 10 species or groups of migratory game birds other than waterfowl, based on data collected for 13 seasons (1964–76) in the Service's Annual Questionnaire Survey of U.S. Waterfowl Hunters. These data are discussed in terms of their usefulness as index values for detecting short-term changes and long-term trends and demonstrating regional differences. Species or groups for which estimates were obtained include the white-winged dove (*Zenaida asiatica*), band-tailed pigeon (*Columba fasciata*), mourning dove (*Zenaida macroura*), American woodcock (*Scolopax minor*), common snipe (*Gallinago gallinago*), sandhill crane (*Grus canadensis*), sora (*Porzana carolina*), other rails, and gallinules, and the American coot (*Fulica americana*).

219. BURY, R. B. 1979. Review of the ecology and conservation of the bog turtle, *Clemmys muhlenbergii*. 9 pp.

Describes the bog turtle (*Clemmys muhlenbergii*) and discusses its distribution, behavior, ecology, habitat, and management.

220. Reid, V. H., and P. D. Goodrum. 1979. Winter feeding habits of quail in longleaf-slash pine habitat. 39 pp.

Crops of northern bobwhite (*Colinus virginianus*) collected during 11 years (7,147 in winter and 92 in other seasons) in the longleaf-slash pine (*Pinus palustris-P. elliottii*) forest type were examined for food content. Habitat management suggestions are given.

221. Buller, R. J. 1979. Lesser and Canadian sandhill crane populations, age structure, and harvest. 10 pp.

Lesser (*Grus canadensis canadensis*) and Canadian (*G. c. rowani*) sandhill cranes were studied from 1974–77 in portions of the Central Flyway and Saskatchewan, Canada. Estimates were made of fall and spring populations, percent juveniles in population, hunting pressure, harvest, and crippling loss. Methods used were visual estimates, hunter contacts, questionnaires, and flyway-wide survey results.

222. Johnson, D. H. 1979. Modeling sandhill crane population dynamics. 10 pp.

Incorporates information, including data from a recent study (Buller 1979), into a mathematical model for assessing the long-range effect of hunting on the Central Flyway population of sandhill cranes (*Grus canadensis*). The model is a simple deterministic system that embodies density-dependent rates of survival and recruitment.

223. Stendell, R. C., R. I. Smith, K. P. Burnham, and R. E. Christensen. 1979. Exposure of waterfowl to lead: a nationwide survey of residues in wing bones of seven species, 1972–73. 12 pp.

Wing bones of 4,190 ducks of seven species collected in 1972 and 1973 were analyzed for lead to provide a baseline for lead burdens and to determine geographic patterns of lead exposure in these species. Species studied were: the mottled duck (*Anas fulvigula*), lesser scaup (*Aythya affinis*), redhead (*Aythya americana*), American black duck (*Anas rubripes*), mallard (*Anas platyrhynchos*), canvasback (*Aythya valisineria*), and northern pintail (*Anas acuta*).

224. Deweese, L. R., C. J. Henny, R. L. Floyd, K. A. Bobal, and A. W. Shultz. 1979. Response of breeding birds to aerial sprays of trichlorfon (Dylox) and carbaryl (Sevin-4-Oil) in Montana forests. 29 pp.

Breeding density, food, nesting success, and mortality of 20 bird species were monitored at Beaverhead National Forest, Montana, in 1975 in conjunction with experimental applications of trichlorfon (Dylox) and carbaryl (Sevin-4-Oil) in western budworms (*Choristoneura occidentalis*).

225. Ross, C. A., and C. D. Roberts. 1979. Scalation of the American alligator. 8 pp.

Examination of scalation of American alligators (*Alligator mississippiensis*) from populations in the eastern and western parts of the species range revealed several scale characteristics that varied between populations, and significant variation in the number of transverse ventral rows, number of nuchal and anterior nuchal scales, number of scales in the anterior dorsal scale row, number of scales in the posterior transverse dorsal scale rows, and occurrence of caudal irregularity.

226. Goldsberry, J. R., S. L. Rhoades, L. D. Schroeder, and M. M. Smith. 1980. Waterfowl status report, 1975. 86 pp.

Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

227. Larned, W. W., S. L. Rhoades, and K. D. Norman. 1980. Waterfowl status report, 1976. 88 pp.

Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

228. Hall, R. J. 1980. Effects of environmental contaminants on reptiles: a review. 12 pp.

The literature relating to the effects of environmental contaminants on reptiles is reviewed and certain generalizations based on studies of other kinds of vertebrates are presented. Needs for future research are discussed.

229. Krohn, W. B., and E. G. Bizeau. 1980. The Rocky Mountain population of the western Canada goose: its distribution, habitats, and management. 93 pp.

The western Canada goose (*Branta canadensis moffitti*) was divided into a Rocky Mountain population (RMP) and a Pacific population on the basis of band recovery patterns examined in this study and recovery data from other investigators. Habitat information obtained from nine cooperating wildlife agencies within the RMP's range provided a baseline for evaluating future changes in nesting, molting, and wintering areas.

230. Blus, L. J., and C. J. Stafford. 1980. Breeding biology and relation of pollutants to black skimmers and gull-billed terns in South Carolina. 18 pp.

The breeding biology and relation of pollutants to black skimmers (*Rynchops niger*) and gull-billed terns (*Sterna nilotica*) were investigated in South Carolina from 1969 through 1975.

231. Craven, S. R. 1981. The Canada goose (*Branta canadensis*)—an annotated bibliography. 66 pp.

All aspects of Canada goose (*Branta canadensis*) biology, research, management, and taxonomy are included.

232. MENZIE, C. M. 1980. Metabolism of pesticides: update III. 709 pp.

Updates and supplements *Special Scientific Report—Wildlife* 127, 184, and 212 (1969, 1974, and 1978, respectively).

233. GEIS, A. D. 1980. Relative attractiveness of different foods at wild bird feeders. 11 pp.

Data on the relative attractiveness of various seeds, consumption rates, and costs provide a basis for determining the most beneficial feeds for use in residential bird feeders.

234. DUEBBERT, H. F., E. T. JACOBSON, K. E. HIGGINS, AND E. B. PODOLL. 1981. Establishment of seeded grasslands for wildlife habitat in the prairie pothole region. 21 pp.

Techniques are described for establishment of seeded grasslands on cultivated soils to provide wildlife habitat within the glaciated prairie pothole region in the north-central United States. The following seeded grassland types are described: 1) introduced cool-season grasses and legumes; 2) tall, warm-season native grasses; and 3) mixed-grass prairie grasses.

235. CLARK, D. R., JR. 1981. Bats and environmental contaminants: a review. 27 pp.

Discusses effects of organochlorine insecticides, mercury, and lead on bats.

236. SMITH, C. S., S. L. RHOADES, AND K. D. NORMAN. 1981. Waterfowl status report, 1977. 88 pp.

Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

237. NOVARA, A. N., S. L. RHOADES, B. I. HODGES, AND K. D. NORMAN. 1981. Waterfowl status report, 1978. 96 pp.

Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

238. EVANS, D. L. 1982. Status reports on twelve raptors. 68 pp.

Presents the distribution, ecology, management, status, and a bibliography of the following species: 1) bald eagle (*Haliaeetus leucocephalus*), 2) Cooper's hawk (*Accipiter cooperii*), 3) merlin (*Falco columbarius*), 4) osprey (*Pandion haliaetus*), 5) peregrine falcon (*Falco peregrinus*), 6) sharp-skinned hawk (*Accipiter striatus*), 7) crested caracara (*Polyborus cheriway*), 8) burrowing owl (*Athene cunicularia*), 9) northern aplomado falcon (*Falco femoralis*), 10) ferruginous hawk (*Buteo regalis*), 11) northern harrier (*Circus cyaneus*), and 12) prairie falcon (*Falco mexicanus*).

239. BANKS, R. C. 1981. Summary of foreign game bird liberations, 1969–78. 23 pp.

240. COULING, L. M., A. R. SEN, AND E. M. MARTIN. 1982. Reliability of kill and activity estimates in the U.S. Waterfowl Hunter Survey. 14 pp.

Data from 1971–73 mail questionnaire surveys of waterfowl hunters were used to determine the effectiveness of present United States sampling and estimation techniques. Modifications in sampling and analyzing are recommended.

241. GISH, C. D., AND D. L. HUGHES. 1982. Residues of DDT, dieldrin, and heptachlor in earthworms during two years following application. 15 pp.

242. HIGGINS, K. F., AND W. T. BARKER. 1982. Changes in vegetation structure in seeded nesting cover in the prairie pothole region. 26 pp.

Species composition, canopy cover, plant height, and visual obstruction were studied in 365 stands of seeded nesting cover during 1977–79. Guidelines for stand quality and longevity in management of seeded nesting cover are suggested.

243. WILSON, S. S., AND L. N. LOCKE. 1982. Bibliography of references to avian botulism: update. 10 pp.

Updates and revises *Special Scientific Report—Wildlife* 204 (1977).

244. SHORT, H. L., AND K. P. BURNHAM. 1982. Technique for structuring wildlife guilds to evaluate impacts on wildlife communities. 34 pp.

Describes a technique for ordering wildlife information according to physical strata and vegetative structure so that a variety of statistical analyses can be accomplished.

245. OHLENDORF, H. M., ET AL. 1982. Organochlorine residues in eggs of Alaskan seabirds. 41 pp.

One egg from each of 440 clutches of eggs of 19 species of Alaskan seabirds collected in 1973–76 was analyzed for organochlorine residues. Frequency of occurrence and concentration of residues were evaluated geographically and by species.

246. VOELZER, J. F., ET AL., EDITORS. 1982. Waterfowl status report, 1979. 96 pp.

Updates and revises *Special Scientific Report—Wildlife* 61 (1961).

247. GRIFFIN, C. R., T. S. BASKETT, AND R. D. SPARROWE. 1982. Ecology of bald eagles wintering near a waterfowl concentration. 12 pp.

Reports on a study of the ecology of bald eagles (*Haliaeetus leucocephalus*) wintering in the vicinity of Swan Lake National Wildlife Refuge in north-central Missouri and, specifically, examines the association of the eagles with waterfowl during the winters of 1975–76, 1976–77, and 1977–78.

248. STOUDT, J. H. 1982. Habitat use and productivity of canvasbacks in southwestern Manitoba, 1961–72. 31 pp.

A study of canvasback (*Aythya valisineria*) breeding populations, nest success, productivity, and habitat requirements was conducted from 1961 to 1972 on a 181.3-km^2 area south of Minnedosa, Manitoba. Additional survey work was conducted in an area northwest of Minnedosa.

249. DUNKS, J. H., ET AL. 1982. Migration, harvest, and population dynamics of mourning doves banded in the central management unit, 1967–77. 128 pp.

Presents information on mourning dove (*Zenaida macroura*) habitat, hunting regulations, and harvest in the central management unit (CMU); distribution and derivation of band recoveries in and from the CMU; distribution of mourning dove harvest in Mexico and Central America; chronology of migration; survival and recovery rates; effects of hunting on CMU mourning dove populations; and indirect nationwide mourning dove population estimates.

250. ATKINSON, R. D., T. S. BASKETT, AND K. C. SADLER. 1982. Population dynamics of mourning doves banded in Missouri. 20 pp.

Discusses Missouri mourning dove (*Zenaida macroura*) banding and recoveries. Describes survival rates and percent mortality.

251. CARNEY, S. M., M. F. SORENSEN, AND E. M. MARTIN. 1983. Duck stamps sold within States and counties during sales years 1971–72 through 1980–81. 44 pp.

Summarizes duck stamp sales by county, State, flyway, and the United States.

252. BOYLE, S. A., AND F. B. SAMSON. 1983. Nonconsumptive outdoor recreation: an annotated bibliography of human–wildlife interactions. 113 pp.

The 536 citations consist of books, articles, government publications, organization reports, theses and dissertations, and selected Federal Aid reports written since 1950 that primarily concern terrestrial vertebrates of North America.

253. BYRD, G. V., AND D. W. WOOLINGTON. 1983. Ecology of Aleutian Canada geese at Buldir Island, Alaska. 18 pp.

254. CARNEY, S. M., M. F. SORENSON, AND E. M. MARTIN. 1983. Distribution of waterfowl species harvested in States and counties during 1971–80 hunting seasons. 114 pp.

Average numbers of waterfowl harvested during the 1971–80 hunting seasons are estimated by species for each county in the continental United States. A brief account of the estimating procedure is included.

Technical Paper

The *Technical Paper* series contains highly technical reports about various species of fish and related topics, such as the effects of herbicide and climate on fish and their environment. Typical subjects include advances in knowledge arising as by-products of broader studies; progress or data reports; surveys, description of equipment, gear, and techniques; proceedings of technical conferences or workshops; and technical bibliographies. Publications are usually typeset and have a standard size of 20 × 26 cm (7 7/8 × 10 1/4 in.); length varies. Intended audiences are research scientists and technically trained management personnel. First issued in 1966, the series merged with the *Special Scientific Report—Wildlife* series in 1985 and was renamed *Fish and Wildlife Technical Report.*

1. KAWAMURA, T. 1966. Distribution of phytoplankton populations in Sandy Hook Bay and adjacent areas in relation to hydrographic conditions in June 1962. 37 pp.

   Describes physiography and hydrography of Sandy Hook Bay and related rivers, New Jersey. Lists phytoplankton species, communities, and populations. Compares bay and river plankton communities. Discusses phytoplankton species succession in summer, 1962, and standing crop of bay and river, determined by chlorophyll a method. Divides area into five regions and mentions the relation between biological and hydrological conditions.

2. YAMAZI, I. 1966. Zooplankton communities of the Navesink and Shrewsbury rivers and Sandy Hook Bay, New Jersey. 44 pp.

   Describes sample collection and analysis, hydrographic conditions, and quantitative distribution of zooplankton. Discusses qualitative distribution of plankton, including plankton communities. Appends a species list, map of the area, and other data.

3. CROCE, N. D. 1966. Observations on the marine cladoceran *Penilia avirostris* in northwestern Atlantic waters. 13 pp.

   Presents and discusses results of study regarding cladoceran reproduction: 1) number of eggs or embryos, 2) number of eggs or embryos and parent size, 3) number of embryos and parent size, 4) youth and reproduction, and 5) parthenogenic and sexual reproduction.

4. ROBBINS, O., JR. 1966. Flathead Lake (Montana) fishery investigations, 1961–64. 45 pp.

   Creel census investigations on Flathead Lake in Montana were conducted from 1961 to 1964 to determine use and harvest, activities of fishermen, and characteristics of the fish resources. Data on fishermen's activities were collected by personal interview and postal questionnaire surveys devised particularly for use on this lake. Information is presented on launching sites; starting and stopping times; residence of fishermen; catch success; fishing pressure distribution; annual use; and numbers, lengths, and weights of fishes.

5. REGAN, D. M. 1966. Ecology of gila trout in Main Diamond Creek in New Mexico. 24 pp.

   Data on gila trout (*Salmo gilae*) ecology were collected from a 2.5-mile section of Main Diamond Creek in New Mexico, in the upper range of the Transition Zone. Stream flow, water temperature, and chemical characteristics were measured. Also studied were fish population, growth rate, condition factor, food use, scale regeneration, and meristic and morphometric characters.

6. FOWLER, L. G., J. H. MCCORMICK, JR., AND A. E. THOMAS. 1966. Studies of caloric and vitamin levels of salmon diets. 14 pp.

   Feeding trials were conducted with fingerling fall chinook salmon (*Oncorhynchus tshawytscha*) to determine the effect of an all-meal diet at four levels of vitamin supplementation and at five caloric levels. Meat supplementation and substitution of soybean oil meal for cottonseed meal in the basal meal ration were also tested.

7. DUPREE, H. K. 1966. Vitamins essential for growth of channel catfish. 12 pp.

   Symptoms were identified in channel catfish (*Ictalurus punctatus*) fed diets deficient in the water-soluble vitamins pyridoxine, pantothenic acid, riboflavin, thiamine, folic acid, nicotinic acid, B-12, or choline. Fat-soluble vitamin A and vitamin K deficiency symptoms were observed after feeding diets that contained beta-carotene and 4.0 mg of menadione (synthetic vitamin K) per 100 g of food (dry weight).

8. ELLIOTT, J. W., L. G. FOWLER, AND R. E. BURROWS. 1966. Effects of age, growth, and diet on characteristics of salmon fingerlings. 11 pp.

   Body composition, blood chemistry, plasma protein composition, and physical blood properties were measured at monthly intervals for two groups of fall chinook salmon fingerlings (*Oncorhynchus tshawytscha*). Fish were fed exclusively either a meat or meal diet. Age, growth, diet, and disease were found to affect one or more of the measured characteristics of these fish.

9. DUPREE, H. K., AND K. E. SNEED. 1966. Response of channel catfish fingerlings to different levels of major nutrients in purified diets. 21 pp.

   Weight gains and feed conversions by channel catfish (*Ictalurus punctatus*) fingerlings were measured for two groups, each fed a different diet: 1) diet containing casein, and 2) diet containing wheat gluten and soybean proteins. Weight gain was correlated with diet protein content and percent cellulose flour. Water temperature effects on weight gain and feed conversions were noted. Serum protein and hematocrit values were examined for both groups, and serum protein paper chromatograms were compared with those of control fish from a local river.

10. ARNOLD, D. E. 1966. Marking fish with dyes and other chemicals. 44 pp.

    Literature on marking fish with chemicals is reviewed, with a critical commentary and suggestions for desirable areas of research. Various substances such as radioisotopes, latex, liquid plastic, metallic compounds, tetracycline antibiotics, inks, paints, and dyes are discussed, together with the methods used to apply them. Methods include deep injection, subcutaneous injection, tattooing, immersion, daubing, and feeding. More than 100 dyes and other chemicals that have been used for marking aquatic animals are listed, and the results of published and unpublished experiments using each one are summarized. Data on experiments by the author using acridin orange, Bismarck brown, and rhodamine B for immersion staining are presented.

11. SQUIRE, J. L., JR. 1967. Surface temperature gradients observed in marine areas receiving warm water discharges. 8 pp.

    Discusses the results of a survey of four areas where heated water from steam-generating plants is injected into marine environments.

12. KENNEDY, H. D. 1967. Seasonal abundance of aquatic invertebrates and their utilization by hatchery-reared rainbow trout. 41 pp.

    A 2-year study of the composition of bottom fauna, its seasonal and annual variations, and its use by hatchery-reared rainbow trout (*Salmo gairdneri*) was made in experimental stream channels of Convict Creek, Mono County, California. Food use was measured with stomach analysis. Gross comparisons were made of the distribution and abundance of aquatic fauna with water velocity, mean depth, and substrate particle size. Forage ratios and frequency of occurrence of the primary food organisms are given.

13. FOWLER, L. G., AND J. L. BANKS. 1967. Test of different components in the Abernathy salmon diet. 18 pp.

    Substitute components in the Abernathy salmon diet were tested in 2 years of feeding trials with fall chinook salmon fingerlings (*Oncorhyncus tshawytscha*). Components tested were turbot, dogfish, and salmon meals; soybean, peanut, corn, cottonseed, and safflower oils; dried buttermilk and skim milk; and wheat germ meal. Storage of diets is mentioned.

14. BUSS, K., AND J. MILLER. 1967. Interspecific hybridization of esocids: hatching success, pattern development, and fertility of some F_1 hybrids. 30 pp.

    Literature is reviewed and the success of reciprocal crosses is recorded, including drawings and photographs showing development of progeny. Fertility of some F_1 hybrids was investigated. Five Esocidae—muskellunge (*Esox masquinongy*), northern pike (*E. lucius*), chain pickerel (*E. niger*), redfin pickerel (*E. americanus americanus*), and grass pickerel (*E. americanus vermiculatus*)—were used as parent species to make 20 reciprocal crosses. The young were maintained from 1 to 4 years, and the fertility of six reciprocal hybrids was established.

15. LENNON, R. E. 1967. Brook trout of Great Smoky Mountains National Park. 18 pp.

    Discusses the ecology of brook trout (*Salvelinus fontinalis*) in Great Smoky Mountains National Park, including distribution, sex ratios, fecundity, morphology, diseases, and stocking. Range and limiting factors such as water temperatures are examined, and management recommendations are provided.

16. HASSLER, T. J., J. M. NEUHOLD, AND W. F. SIGLER. 1967. Effects of alkyl benzene sulfonate on rainbow trout. 15 pp.

    Toxicity of detergent levels to rainbow trout (*Salmo gairdneri*) was determined by probit analysis. Effects on gill tissues and blood were noted and measured. The LC50 was 3.48 mg/L ABS after 24 h exposure and 2.53 mg/L after 120 h.

17. EISLER, R. 1967. Tissue changes in puffers exposed to methoxychlor and methyl parathion. 15 pp.

    Adult northern puffers (*Sphoeroides maculatus*) were exposed for periods up to 45 days to either 30 parts per billion (ppb) of the organochloride insecticide methoxychlor, 20,200 ppb of the organophosphorous

insecticide methyl parathion, or to a combination of 15 ppb of methoxychlor and 10,100 ppb of methyl parathion. Periodically, fish from each group were analyzed for whole blood and serum constituents and for content of sodium, potassium, calcium, magnesium, zinc, and iron in selected tissues.

18. WALBURG, C. H. 1969. Fish sampling and estimation of relative abundance in Lewis and Clark Lake. 15 pp.

    Catches by gill nets, frame nets, trap nets, 4.9- and 8.2-m otter trawls, seines, and a 220-V electroshocker, from 1962 to 1964, were compared to determine practical methods for annual measuring of the fish population in Lewis and Clark Lake.

19. MULLAN, J. W., AND R. L. APPLEGATE. 1969. Use of an echosounder in measuring distribution of reservoir fishes. 16 pp.

    A recording white-line depth sounder was used to study annual fish distribution in two deep reservoirs on the White River, Arkansas, and Missouri. Varying seasonal activity levels of fish, attenuation of the sound beam at depths greater than 100 ft, and lack of precision in the identification of echo traces precluded rigorous interpretation of echograms. The inherent picture sense of echograms provided seasonal perspectives of fish distribution with respect to 1) diel movement, 2) depth and basin location, 3) limnetic concentrations, and 4) oxygen-temperature conditions.

20. HEIMSTRA, N. W., D. K. DAMKOT, AND N. G. BENSON. 1969. Some effects of silt turbidity on behavior of juvenile largemouth bass and green sunfish. 9 pp.

    Activity, feeding, attack, and scraping behavior of juvenile largemouth bass (*Micropterus salmoides*) and green sunfish (*Lepomis cyanellus*) in aquariums were measured under conditions of clear water, 4–6 Jackson Turbidity Units (JTU), and 14–16 JTU for 30 days. Turbidity effects on social hierarchies were studied.

21. NELSON, W. R. 1969. Biological characteristics of the sauger population in Lewis and Clark Lake. 11 pp.

    Age and rate of growth, sex ratio, maturity, fecundity, movement, and exploitation rates were determined for the sauger (*Stizostedion canadense*) population in Lewis and Clark Lake and the Missouri River between Gavins Point and Fort Randall dams. Suggested management measures for sauger include introduction of forage fish to improve growth, increased angler harvest, and reduction of water level fluctuation on spawning grounds to improve year-class strength.

22. SIEFERT, R. E. 1969. Biology of the white crappie in Lewis and Clark Lake. 16 pp.

    Describes general studies of the biology of white crappie (*Pomoxis annularis*). Topics include: 1) spawning dates, 2) reproduction success, 3) young-of-the-year emigration, 4) young-of-the-year length, 5) early stage larvae diet, 6) growth, 7) sexual maturation, and 8) preferred diet.

23. THOMAS, A. E., AND J. M. SHELTON. 1968. Operation of Abernathy Channel for incubation of salmon eggs. 19 pp.

    A spawning and incubation channel constructed in 1959 on Abernathy Creek near Longview, Washington, has been used for seasons to incubate fall chinook salmon (*Oncorhynchus tshawytscha*) and chum salmon (*O. keta*) eggs. Studies included effects of sedimentation, egg planting density, and stage of egg development at planting on survival.

24. DEAN, J. L. 1969. Biology of the crayfish *Orconectes causeyi* and its use for control of aquatic weeds in trout lakes. 15 pp.

    Life history, ecology, and weed control activities of crayfish (*Orconectes causeyi*) are discussed. Describes populations, reproduction, sex ratios, damage, and relation with agriculture. Mentions crayfish control of some species of following genera of aquatic plants: *Potamogeton, Myriophyllum, Elodea, Ceratophyllum, Ranunculus, Chara,* and filamentous algae.

25. SANDERS, H. O. 1969. Toxicity of pesticides to the crustacean *Gammarus lacustris*. 18 pp.

    Static bioassays were conducted to determine the relative acute toxicities of some insecticides, herbicides, fungicides, and a defoliant to the scud *Gammarus lacustris*. Toxic effects were measured by determination of Median Lethal Concentration (LC50) for 24-, 48-, and 96-h exposures at 70° F.

26. FOWLER, L. G., AND J. L. BANKS. 1969. Tests of vitamin supplements and formula changes in the Abernathy salmon diet, 1966–67. 19 pp.

    Discusses results of diet trials on fall chinook salmon (*Oncorhynchus tshawytscha*) fingerlings. Abernathy and Oregon pellets were tested, as well as the following supplements: 1) vitamins C, E, and K, 2) paraaminobenzoic acid, 3) B_{12}, 4) cod liver oil, 5) blood meal, 6) distiller's solubles, 7) crab meal, 8) salt, 9) hake meal, 10) salmon meal, 11) dried buttermilk, 12) dried skim milk, 13) low and high protein cottonseed meals, and 14) rancid fish meals.

27. DUPREE, H. K. 1969. Influence of corn oil and beef tallow on growth of channel catfish. 13 pp.

    Fingerling channel catfish (*Ictalurus punctatus*) were offered a series of 18 purified diets that contained liquid corn oil, solid corn oil, and beef tallow at 4, 8, and 16% of the dry diet; and white dextrin at 8 and 16% of the dry diet. Effect of the dietary variables was based on proximate analysis for

protein, ash, moisture, lipid, and iodine absorption number of the lipid of entire fish at the start and end of the experiment.

28. CLARK, J., W. G. SMITH, A. W. KENDALL, JR., AND M. P. FAHAY. 1969. Studies of estuarine dependence of Atlantic coastal fishes. 132 pp.

    Presents basic data from a survey including eight cruises from Cape Cod, Massachusetts, to Cape Lookout, North Carolina, from December 1965 to December 1966. Data reported include temperatures, salinities, zooplankton volumes, and midwater trawl collections of fishes.

29. HASSLER, T. J. 1969. Biology of the northern pike in Oahe Reservoir, 1959 through 1965. 13 pp.

    Variations in length, weight, and maturity of northern pike (*Esox lucius*) in Oahe Reservoir were associated with sex and year class. Effects of impoundment on year-class sizes are discussed.

30. ELROD, J. H., AND T. J. HASSLER. 1969. Estimates of some vital statistics of northern pike, walleye, and sauger populations in Lake Sharpe, South Dakota. 17 pp.

    Catch-effort data derived from gill net samples were used to estimate relative abundance, age composition, sex ratio, growth rate, survival rate, and relative year-class strength of northern pike (*Esox lucius*), walleye (*Stizostedion vitreum*), and sauger (*S. canadense*) populations in Lake Sharpe, Missouri River, South Dakota, during the first 3 years of impoundment (1964–66).

31. HERMAN, R. L. 1969. Oxytetracycline in fish culture—a review. 9 pp.

    Reviews literature on the use of oxytetracycline in fish culture. Subjects include growth promotion, disease treatment, toxicity, and skeletal marking.

32. BULLOCK, G. L., AND D. COLLIS. 1969. Oxytetracycline sensitivity of selected fish pathogens. 9 pp.

    Selected representatives of several genera of gram-negative fish pathogenic bacteria were tested for in vitro and in vivo sensitivity to oxytetracycline hydrochloride (Terramycin).

33. HERMAN, R. L. 1969. Oxytetracycline toxicity to trout. 4 pp.

    To establish oral toxicity of oxytetracycline to trout, rainbow (*Salmo gairdneri*) and brook trout (*Salvelinus fontinalis*) were given different levels in their food. In addition, rainbow trout were force-fed known amounts.

34. CURRAN, D., AND R. L. HERMAN. 1969. Oxytetracycline efficacy as a pretreatment against columnaris and furunculosis in coho salmon. 6 pp.

    Coho salmon (*Oncorhynchus kisutch*) fed 100 mg oxytetracycline per kilogram per day beginning 3 days before exposure to pathogens were protected against infection by *Chondrococcus columnaris* and drug sensitive *Aeromonas salmonicida*.

35. ROBINSON, J. A., F. P. MEYER, AND J. H. FRIBOURGH. 1969. Oxytetracycline efficacy against bacterial infections in blue and channel catfishes. 7 pp.

    Presents and discusses results of in vitro studies, in vivo studies with experimental infections, and in vivo studies with natural infections to test the efficacy of oxytetracycline for blue (*Ictalurus furcatus*) and channel catfish (*I. punctatus*).

36. AMEND, D. F. 1969. Oxytetracycline efficacy as a treatment for furunculosis in coho salmon. 6 pp.

    Coho salmon (*Oncorhynchus kisutch*) were infected with *Aeromonas salmonicida* (furunculosis) and treated with oxytetracycline at different stages of disease severity to determine the drug efficacy.

37. HERMAN, R. L., D. COLLIS, AND G. L. BULLOCK. 1969. Oxytetracycline residues in different tissues of trout. 6 pp.

    Oxytetracycline, as TM-50, was fed to rainbow (*Salmo gairdneri*), brook (*Salvelinus fontinalis*), and brown trout (*Salmo trutta*) held at 3 temperatures, 6–7, 9–10, and 12–13 °C. Liver, muscle, plasma, and kidney tissues were assayed to determine excretion rates.

38. FRIBOURGH, J. H., J. A. ROBINSON, AND F. P. MEYER. 1969. Oxytetracycline residues in tissues of blue and channel catfishes. 7 pp.

    Reports results of investigations at the Fish Farming Experimental Station concerning oxytetracycline concentrations and residues in blue (*Ictalurus furcatus*) and channel catfish (*I. punctatus*) tissues following oral administration of the drug under natural feeding conditions.

39. FRIBOURGH, J. H., J. A. ROBINSON, AND F. P. MEYER. 1969. Oxytetracycline levels produced in catfish serum by three methods of treatment. 6 pp.

    Compares concentration and residue of oxytetracycline in channel catfish (*Ictalurus punctatus*) blood following injection, force-feeding, and natural feeding of the antibiotic.

40. FRIBOURGH, J. H., F. P. MEYER, AND J. A. ROBINSON. 1969. Oxytetracycline leaching from medicated fish feeds. 7 pp.

    Tests were conducted at the Fish Farming Experimental Station to determine residue levels in selected tissues following the feeding of oxytetracycline to channel (*Ictalurus punctatus*) and blue catfish (*I. furcatus*), and its efficacy against bacterial infections. Discusses whether or not significant leaching of the drug occurred, and the

effects of pellet surface to volume ratio, water temperature, and hydrogen ion concentration of the medium on leaching.

41. WADE, R. A. 1969. Ecology of juvenile tarpon and the effects of dieldrin on two associated species. 85 pp.

    Presents and discusses results of bioassay studies of dieldrin on the sheepshead minnow (*Cyprinodon variegatus*) and sailfin molly (*Poecilia latipinna*). Means and variances of seventy-six, 48-h TL_m bioassays for effects of dieldrin at three temperatures, three salinities, and two hydrogen-ion concentrations are presented. Symptoms in the two fish species are described. The ecology of the juvenile tarpon (*Megalops atlanticus*) is discussed, including distribution and consequences of habitat alteration.

42. CALABRESE, A. 1969. Effect of acids and alkalies on survival of bluegills and largemouth bass. 10 pp.

    To determine whether manipulation of hydrogen-ion concentration of the water could be used to selectively kill bluegills (*Lepomis macrochirus*) in farm-pond fish populations consisting of bluegills and largemouth bass (*Micropterus salmoides*), tests were conducted with both tap and pond waters in aquariums and with stream water in plastic-lined pools. The pH was changed by addition of hydrochloric acid, acetic acid, sodium hydroxide, and calcium hydroxide; tests were carried out in the pH range of 3.3 to 11.2.

43. FIJAN, N. N., T. L. WELLBORN, JR., AND J. P. NAFTEL. 1970. An acute viral disease of channel catfish. 11 pp.

    Describes symptoms of channel catfish (*Ictalurus punctatus*) fry and fingerlings affected with channel catfish virus disease (CCVD) at four widely separated fish farms in 1968. Discusses isolation of the virus and identifies it as cause of four epizootics. The CCVD virus was also tested in cultures of brown bullhead (*I. nebulosus*), rainbow trout (*Salmo gairdneri*), fathead minnow (*Pimephales promelas*), and bluegill (*Lepomis macrochirus*) fry cells.

44. BARKULOO, J. M. 1970. Taxonomic status and reproduction of striped bass (*Morone saxatilis*) in Florida. 16 pp.

    Striped bass (*Morone saxatilis*) from the Apalachicola and St. Johns rivers in Florida were compared taxonomically with striped bass from other drainages on the Atlantic coast and Gulf of Mexico. Both rivers contain endemic striped bass populations. Reproduction requirements and factors limiting the abundance of striped bass in Florida are discussed.

45. EISLER, R. 1970. Factors affecting pesticide-induced toxicity in an estuarine fish. 20 pp.

    Factors affecting mortality caused by orgnochlorine and organophosphorus insectides in the mummichog (*Fundulus heteroclitus*) include duration of exposure; concentration and class of chemical; degradation or alteration of experimental compounds in seawater; and temperature, salinity, and pH of the medium. Static bioassays with organochlorine (endrin, aldrin, dieldrin, heptachlor, *p,p'*-DDT, lindane, methoxychlor) and organophosphorus (malathion, DDVP, methyl parathion, Phosdrin, dioxathion) insecticides were conducted on mummichogs at 24‰ salinity, 20 °C, and pH 8.0.

46. EISLER, R. 1970. Acute toxicities of organochlorine and organophosphorus insecticides to estuarine fishes. 12 pp.

    Static 96-h bioassays with 12 insecticides and 7 species of estuarine teleosts (American eel, *Anguilla rostrata*; mummichog, *Fundulus heteroclitus*; striped killifish, *F. majalis*; bluehead, *Thalassoma bifasciatum*; striped mullet, *Mugil cephalus*; Atlantic silverside, *Menidia menidia*; northern puffer, *Sphaeroides maculatus*) were conducted at 24‰ salinity, 20 °C, and pH 8.0.

47. FOWLER, L. G., AND J. L. BANKS. 1970. Tests of substitute ingredients and effects of storage in the Abernathy salmon diet, 1968. 8 pp.

    Feeding experiments in 1968 with fall chinook salmon fingerlings (*Oncorhynchus tschawytscha*) investigated effects of varying amounts of Peruvian anchovy meal, herring meal, hake meal, dried skim milk, dried whey, salmon oil, and soybean oil in the diet. Various storage times were also noted.

48. JOHNSON, S. I., AND J. L. SQUIRE, JR. 1970. Surface currents as determined by drift card releases on the continental shelf off the northwestern United States. 12 pp.

    Measurements of surface current drift off Oregon and Washington were made from March 1964 through February 1966 with plastic drift cards dropped from Coast Guard airplanes at selected points. Discusses wind direction and intensity as indications of surface current flow.

49. HOUSER, A., AND H. E. BRYANT. 1970. Age, growth, sex composition, and maturity of white bass in Bull Shoals Reservoir. 11 pp.

    White bass (*Roccus chrysops*) in Bull Shoals Reservoir were studied from October 1963 through January 1966 to determine age, growth, sex composition, and maturity. Results are compared with data from other regions.

50. MULLAN, J. W., AND R. L. APPLEGATE. 1970. Food habits of five centrarchids during filling of Beaver Reservoir, 1965–66. 16 pp.

    Stomach contents were examined from 1,886 largemouth bass (*Micropterus salmoides*), 334 spotted

bass (*M. punctulatus*), 1,689 bluegills (*Lepomis macrochirus*), 918 green sunfish (*L. cyanellus*), and 579 longear sunfish (*L. megalotis*) from shoreline areas of Beaver Reservoir during 2 of the first 3 years of filling. Quality and quantity of food by seasons and size groups (<50, 50–100, 101–200, and >200 mm in total length) is related to abundance of the principal forage.

51. BRYANT, H. E., AND D. I. MORAIS. 1970. Identification of ingested gizzard shad and threadfin shad by gizzard dimensions. 5 pp.

    The remains of gizzard shad (*Dorosoma cepedianum*) and threadfin shad (*D. petenense*) in predator stomachs can be specifically identified by differences in their gizzard dimensions. A separation line equidistant from the gizzard length-width means of the two species in terms of standard deviations is presented, as well as a regression of total fish length on gizzard width.

52. MULLAN, J. W., D. I. MORAIS, AND R. L. APPLEGATE. 1970. Thermal, oxygen and conductance characteristics of a new and an old Ozark reservoir. 29 pp.

    Thermal, oxygen, and conductance characteristics are described for two impoundments of the White River in Arkansas and Missouri, from 1963 to 1967. Bull Shoals was filled in 1952 and is 18,400 ha at the top of the power pool; upstream Beaver Reservoir began filling in 1964 and reached 10,700 ha in 1966 (94% of the power pool area).

53. KENNEDY, H. D., L. L. ELLER, AND D. F. WALSH. 1970. Chronic effects of methoxychlor on bluegills and aquatic invertebrates. 18 pp.

    Bluegills (*Lepomis macrochirus*; average weight 7 g, average fork length 73 mm) were exposed to methoxychlor at concentrations of 0, 0.01, and 0.04 ppm in ponds for 13 weeks in late summer. Discusses methoxychlor effects on fish numbers, growth, pathologic changes in tissues and organs, and fish uptake of the insecticide. Describes differences in insect population densities between high-treatment, low-treatment, and untreated ponds. Pond-bottom mud was sampled for methoxychlor residues.

54. ANDERSON, H. G., JR. 1970. Annotated list of the parasites of bluefish *Pomatomus saltatrix*. 15 pp.

    Presents results of a study of bluefish (*Pomatomus saltatrix*) on the Atlantic coast. Includes information about 37 parasites.

55. KENNEDY, H. D., AND D. F. WALSH. 1970. Effects of malathion on two warmwater fishes and aquatic invertebrates in ponds. 13 pp.

    Bluegills (*Lepomis macrochirus*) and channel catfish (*Ictalurus punctatus*) were exposed to four applications of malathion at two concentrations in ponds during an 11-week summer period. Presents and discusses results of studies on fish numbers, fish growth or microhematocrit values, pathology, brain cholinesterase activity, and reproduction. Species composition and population densities of aquatic invertebrates were also examined.

56. GASAWAY, C. R. 1970. Changes in the fish population in Lake Francis Case in South Dakota in the first 16 years of impoundment. 30 pp.

    Describes species composition, total number of fish, number of fish by species, and forage fish populations in Lake Francis Case from 1952–1968. Growth and reproduction are also discussed.

57. WARES, P. G. 1971. Biology of the pile perch, *Rhacochilus vacca*, in Yaquina Bay, Oregon. 21 pp.

    Growth, reproduction, food habits, and parasites of pile perch (*Rhacochilus vacca*), were investigated in Yaquina Bay, Oregon, between April 1966 and July 1967. The research disclosed that pile perch live at least 10 years.

58. RUCKER, R. R. 1972. Gas-bubble disease of salmonids: a critical review. 11 pp.

    Explains gas-bubble disease and describes its symptoms and the gases that cause it. Discusses how the amount of gas can be measured and reduced. Saturation tables for atmospheric oxygen and nitrogen in water for 0 to 30 °C are presented.

59. CLARK, J., W. G. SMITH, A. W. KENDALL, JR., AND M. P. FAHAY. 1970. Studies of estuarine dependence of Atlantic coastal fishes. Data report II: southern section, New River Inlet, North Carolina, to Palm Beach, Florida. *R. V. Dolphin* Cruises 1967–68: zooplankton volumes, surface-meter net collections, temperatures, and salinities. 97 pp.

    Presents data from the second year of a 2-year survey of the Atlantic continental shelf to locate spawning areas, determine seasons, and follow movements of larval and juvenile stages from spawning grounds. Data include temperatures, salinities, zooplankton volumes, and surface-meter net collections of juvenile fishes.

60. BULLOCK, G. L. 1972. Studies on selected myxobacteria pathogenic for fishes and on bacterial gill disease in hatchery-reared salmonids. 30 pp.

    Morphological, physiological, and serological studies on 55 myxobacteria isolated principally from gill disease, tail rot, and other myxobacterial infections showed that a variety of myxobacteria occur in these infections. Myxobacteria were tested for agglutinin and agar gel precipitin reactions. Studies to induce and transmit gill disease were performed on fingerling trout. Levels of agglutinins against myxobacteria in yearling trout were measured, and cross-absorption studies were performed on 10 of these cultures.

61. FOWLER, L. G., J. L. BANKS, AND J. W. ELLIOTT. 1972. Tests of variations of the Abernathy salmon diet, 1970. 13 pp.

    Presents and discusses results of 1970 fall chinook salmon (*Oncorhynchus tshawytscha*) feeding trials. Diet elements tested and compared for efficiency were dry pellets, moist pellets, ratio of dried whey product and wheat germ meal, cottonseed meal, soybean oil, and two corn distillers' products. Effect of storage on nutritional adequacy of dry pellets was noted.

62. AMEND, D. F. 1972. Efficacy, toxicity, and residues of Nifurpirinol in salmonids. 13 pp.

    Nifurpirinol (NFP), also known by the code name P-7138, was tested for control of furunculosis, myxobacterioses, and vibriosis; and for its effects on rainbow trout (*Salmo gairdneri*), silver salmon (*Oncorhynchus kisuch*), and chinook salmon (*O. tshawytscha*) under various conditions. NFP was administered by immersion and by feeding, if fish would accept treated food. Toxicity of NFP was tested at different dosage levels, treatment frequencies, and water temperatures. NFP levels in tissues were measured.

63. PUTZ, R. E. 1972. Biological studies on the hemoflagellates *Cryptobia cataractae* and *Cryptobia salmositica*. 25 pp.

    Two hemoflagellates of fish, *Cryptobia cataractae* and *C. salmositica*, were studied to determine host range, vector relations, in vivo culture, in vitro culture, pathogenicity, and cryogenic preservation.

64. FOWLER, L. G., AND J. L. BANKS. 1972. Alteration tests of the Abernathy salmon diet, 1971. 12 pp.

    Presents and discusses results of 1971 fall chinook salmon (*Oncorhynchus tshawytscha*) feeding trials. Effects different levels of cottonseed meal, wheat and corn gluten meal, dried whey product with different lactose contents, methionine supplement, anchovy meal, and herring meal on fish growth were tested. Diets with different protein percentages were compared. Soybean lecithin and oil were compared as caloric sources.

65. TINDLE, R. C. 1972. Handbook of procedures for pesticide residue analysis. 88 pp.

    Describes and explains sample preparation, extraction, clean-up, and analysis techniques.

66. SANDERS, H. O. 1972. Toxicity of some insecticides to four species of malacostracan crustaceans. 19 pp.

    Acute and long-term (20-day) toxicities of 40 insecticides to four species of freshwater malacostracan crustaceans—scud (*Gammarus fasciatus*), crayfish (*Orconectes nais*), glass shrimp (*Palaemonetes kadiakensis*), and aquatic sowbug (*Asellus brevicaudus*)—were determined in static and intermittent-flow bioassays.

67. INGLIS, A., AND E. L. DAVIS. 1972. Effects of water hardness on the toxicity of several organic and inorganic herbicides to fish. 22 pp.

    Effects of water hardness on the acute toxicity of organic and inorganic herbicides were determined in static bioassays. Concentrations of total hardness (calculated as $CaCO_3$) of 13.0, 52.2, 208.7, and 365.2 ppm were tested in water containing calcium to magnesium ion ratios of 1:1 and 5:1. Bluegills (*Lepomis macrochirus*) were the principal test species. Organic herbicides tested included three formulations of 2,4-D, three formulations of endothall, and one formulation each of silvex pentachlorophenol and dichlobenil; inorganic herbicides included technical grades of sodium arsenite and copper sulfate.

68. PARSONS, J. W. 1973. History of salmon in the Great Lakes, 1850–1970. 80 pp.

    Describes the decline and extinction of Atlantic salmon (*Salmo salar*) in Lake Ontario in the 1800's; the failure to establish, by salmon culture, permanent or sizable populations of Atlantic or Pacific salmon in any of the Great Lakes in 1867–1965; and the success of plantings of silver (*Oncorhynchus kisutch*) and chinook salmon (*O. tshawytscha*) in the Great Lakes during 1966–70—particularly in Lake Michigan.

69. CARR, J. F., J. W. MOFFETT, AND J. E. GANNON. 1973. Thermal characteristics of Lake Michigan, 1954–55. 143 pp.

    The thermal regime of Lake Michigan is described on the basis of analysis of 1,671 bathythermograph casts made in 1954 and 1955. The beginning, duration, geographic extent, and ending of thermal stratification were determined from 51 thermal profiles from all areas of the open lake.

70. ALLEN, H. E. 1973. Seasonal variation of nitrogen, phosphorus, and chlorophyll a in Lake Michigan and Green Bay, 1965. 23 pp.

    Total and dissolved phosphorus, nitrate, and chlorophyll a were measured at four stations in northern Lake Michigan (inshore Michigan, offshore Michigan, offshore Wisconsin, and inshore Wisconsin) and one station in southern Green Bay during 16 sampling periods in 1965. Nutrients were measured at depths of 2, 5, and 10 m and chlorophyll a at 2 m.

71. JUNE, F. C. 1974. Ecological changes during the transitional years of final filling and full impoundment (1966–70) of Lake Oahe, an upper Missouri River storage reservoir. 57 pp.

    Gives synoptic data and trends on water discharge, water level, sedimentation, turbidity, transmissivity,

temperature, specific conductance, dissolved oxygen, and plankton.

72. SELGEBY, J. H., AND W. E. JONES. 1974. Physical and chemical characteristics of Lake Oahe, 1968–69. 18 pp.

    The physical and chemical characteristics presented provide a description of Lake Oahe and establish bases for certain characteristics which may alter as the reservoir ages. Parameters measured include water temperature, wind-driven currents, water depth, duration of thermal stratification, dissolved oxygen, nitrate nitrogen, soluble phosphorus, and silica levels.

73. JONES, W. E., AND J. H. SELGEBY. 1974. Invertebrate macrobenthos of Lake Oahe, 1968–69. 11 pp.

    Presents and discusses results of a study during 1968–69. Objectives of the sampling program were to determine benthos distribution and abundance in the main stem; determine longitudinal, seasonal, and depth distribution in a major tributary embayment; and establish a monitoring station and sampling system to evaluate later changes in benthos.

74. SELGEBY, J. H. 1974. Limnetic crustacean zooplankton of Lake Oahe, May–October 1969. 11 pp.

    Describes composition and abundance of crustacean zooplankton throughout the ice-free season at selected locations in Lake Oahe.

75. GABEL, J. A. 1974. Species and age composition of trap net catches in Lake Oahe, South Dakota, 1963–67. 21 pp.

    Catch was dominated by eight species in order of abundance: black crappie (*Pomoxis nigromaculatus*), bigmouth buffalo (*Ictiobus cyprinellus*), white crappie (*Pomoxis annularis*), common carp (*Cyprinus carpio*), river carpsucker (*Carpiodes carpio*), freshwater drum (*Aplodinotus grunniens*), smallmouth buffalo (*Ictiobus bubalus*), and goldeye (*Hiodon alosoides*).

76. NELSON, W. R., AND M. F. BOUSSU. 1974. Evaluation of trawls for monitoring and harvesting fish populations in Lake Oahe, South Dakota. 15 pp.

    Trawls of various designs and sizes were compared to evaluate their use for monitoring and harvesting fish populations in Lake Oahe. Different sizes of semiballoon trawls and high-rise trawls were tested, and small-mesh trawls and trap nets were compared.

77. NELSON, W. R. 1974. Age, growth, and maturity of thirteen species of fish from Lake Oahe during the early years of impoundment, 1963–68. 29 pp.

    Body–scale relation, calculated length, length–weight relation, age at maturity, and sex ratio of 13 major species collected in Lake Oahe from 1963 to 1968 with trap nets and bottom trawls are described.

78. MOEN, T. E. 1974. Population trends, growth, and movement of bigmouth buffalo, *Ictiobus cyprinellus*, in Lake Oahe, 1963–70. 20 pp.

    Presents and discusses results of bigmouth buffalo (*Ictiobus cyprinellus*) studies. Growth data include sexual and age variation, and sex ratios.

79. MILLER, G. L., AND W. R. NELSON. 1974. Goldeye, *Hiodon alosoides*, in Lake Oahe: abundance, age, growth, maturity, food, and the fishery, 1963–69. 13 pp.

80. HIGHAM, J. H. 1974. The commercial fishery in Lake Oahe, North and South Dakota, 1964–70. 15 pp.

    Lists 10 species commercially harvested and discusses seasonal and annual production variation in bigmouth buffalo (*Ictiobus cyprinellus*). Includes usual fishing season length and principal fishing gears.

81. STAROSTKA, V. J., AND W. R. NELSON. 1974. Age, growth, sexual maturity, and food of channel catfish in central Lake Oahe, 1968–69. 13 pp.

    Channel catfish, *Ictalurus punctatus*, were collected with gill nets, trawl, and trap nets at three localities in Lake Oahe for the study of year-class strength, growth in length and weight, age composition, sexual maturity, and food.

82. GABEL, J. A. 1974. An experimental trap net fishery, Lake Oahe, South Dakota, 1965. 9 pp.

    Large trap nets were evaluated as commercial gear for capturing buffalo fish during July–September 1965. Both 7.0-cm and 12.7-cm mesh (extended measure) were used in back of a bailing crib of nets to determine the effects of 12.7-cm mesh in reducing the catch of sport species and nonmarketable size groups of commercial species.

83. WRIGHT, F. T. 1975. Atlantic salmon (*Salmo salar*): an annotated bibliography. 22 pp.

    Presents a bibliography with international sources on detection, diagnosis, identification, and control of diseases of Atlantic salmon (*Salmo salar*).

84. VOGELE, L. E. 1975. Reproduction of spotted bass, *Micropterus punctulatus*, in Bull Shoals Reservoir, Arkansas. 21 pp.

    Spotted bass (*Micropterus punctulatus*) were studied in Bull Shoals Reservoir during 1966–71 to determine some environmental requirements for successful spawning and to estimate their reproductive potential. Environmental factors studied included water levels, temperatures, and transparency.

85. HEARTWELL, C. M. III. 1975. Immune response and antibody characterization of the channel catfish (*Ictalurus punctatus*) to a naturally pathogenic bacterium and virus. 34 pp.

Channel catfish (*Ictalurus punctatus*) were inoculated with *Chondiacoccus columnaris* and channel catfish virus, and primary and secondary responses were noted. Total serum proteins and selected isozyme systems were analyzed by acrylamide gel electrophoresis. Antibody activity was examined and antibacterial serums were subjected to immunoelectrophoresis.

86. Brauhn, J. L., R. C. Simon, and W. R. Bridges. 1976. Rainbow trout growth in circular tanks: consequences of different loading densities. 16 pp.

Investigates ammonia nitrogen resulting from high densities of rainbow trout (*Salmo gairdneri*) as a cause of reductions in growth, yield, and food-use efficiency.

87. June, F. C. 1976. Changes in young-of-the-year fish stocks during and after filling of Lake Oahe, an upper Missouri River storage reservoir, 1966–74. 25 pp.

Young-of-the-year fish stocks of Lake Oahe were sampled with a 30.5- × 2.4-m haul seine at semimonthly intervals, from July to September during 1966–74. Data are presented and discussed for species numbers and abundance, and for the effects of forage fish on total fish abundance. Describes population trends and growth rates for the two most abundant species, yellow perch (*Perca flavescens*) and emerald shiners (*Notropis atherinoides*). Suggests factors causing general decline in species numbers and abundance after filling the reservoir.

88. Folmar, L. C. 1977. Acrolein, dalapon, diochlobenil, diquat, and endothal: bibliography of toxicity to aquatic organisms. 16 pp.

Toxicity tables for the herbicides acrolein, dalapon, dichlobenil, diquat, and endothal list the test organisms, types of tests, experimental conditions, and test results. Each table is followed by a list of references.

89. Wedemeyer, G. A., and W. T. Yasutake. 1977. Clinical methods for the assessment of the effects of environmental stress on fish health. 18 pp.

Clinical methods are presented for biological monitoring of hatchery and native fish populations to assess the effects of environmental stress on fish health. Detailed analysis methods, together with guidelines for sample collection and for the interpretation of results, are given for tests on blood (cell counts, chloride, cholesterol, clotting time, cortisol, glucose, hematocrit, hemoglobin, lactic acid, methemoglobin, osmolality, and total protein); water (ammonia and nitrite content); and liver and muscle (glycogen content).

90. Bennett, D. E., and R. S. Wydoski. 1977. Biology of the redtail surfperch (*Amphistichus rhodoterus*) from the central Oregon coast. 23 pp.

Investigates the redtail surfperch for 1) biology—annulus formation, total length, weight, age group, and growth; 2) reproduction—season, number, mean size, and mortality of embryos; 3) food; and 4) parasites.

91. Johnson, W. W., and H. O. Sanders. 1977. Chemical forest fire retardants: acute toxicity to five freshwater fishes and a scud. 7 pp.

Toxicities of four chemical forest fire retardants, Fire-Trol 100 and 931 (ammonium sulfate or polyphosphate with an attapulgite clay thickener) and Phos-Chek 202A and 259 (diammonium phosphate with a guar gum derivative thickener) were determined by static and flow-through toxicity tests for fry and fingerling coho salmon (*Oncorhynchus kisutch*) and rainbow trout (*Salmo gairdneri*); fingerling fathead minnows (*Pimephales promelas*), bluegills (*Lepomis macrochirus*), and largemouth bass (*Micropterus salmoides*); and mature scuds (*Gammarus pseudolimnaeus*).

92. Berlin, W. H., L. T. Brooke, and L. J. Stone. 1977. Verification of a model for predicting the effect of inconstant temperature on embryonic development of lake whitefish (*Coregonus clupeaformis.*) 6 pp.

Eggs stripped from lake whitefish (*Coregonus clupeaformis*) spawning in Lake Michigan were incubated in the laboratory at temperatures similar to those on whitefish spawning grounds in Lake Michigan during December–April. Observed times from fertilization to attainment of each of 21 developmental stages were used to test a model that predicts the rate of development of daily fluctuating temperatures; the model relates rates of development for any given stage j, expressed as the reciprocal of time (R_j), to temperature (T). The generalized equation for a developmental stage is $R_j = ab^T c^{T2}$.

93. Heberger, R. F., and J. B. Reynolds. 1977. Abundance, composition, and distribution of crustacean zooplankton in relation to hypolimnetic oxygen depletion in west-central Lake Erie. 17 pp.

94. Morton, J. W. 1977. Ecological effects of dredging and dredge spoil disposal: a literature review. 33 pp.

Comprehensively reviews literature on physical, chemical, and biological effects of dredging and dredge spoil disposal in estuaries, and identifies other spoil disposal methods.

95. Walburg, C. H. 1977. Lake Francis Case, a Missouri River reservoir: changes in the fish population in 1954–75, and suggestions for management. 12 pp.

Discusses water-level fluctuations as a cause of a decline in fish abundance over 23 years. Recommends water-level management for managing fish abundance.

96. POSTON, H. A. 1978. Neuroendocrine mediation of photoperiod and other environmental influences on physiological responses in salmonids: a review. 14 pp.

    Describes physiological responses to environmental influences such as water temperature, water salinity and diet salt, and photoperiod. Discusses the relation between neurohormones and pituitary hormones, the timekeeping role of the pineal gland in rhythmic metabolism, and variables affecting the influence of the pineal gland on metabolism. Presents implications of environmental control in salmonid culturing.

97. WOODWARD, D. F., AND F. L. MAYER, JR. 1978. Toxicity of three herbicides (butyl, isooctyl, and propylene glycol butyl ether esters of 2,4-D) to cutthroat trout and lake trout. 6 pp.

    Discusses the effects of three herbicides on cutthroat trout (*Salmo clarkii*) and lake trout (*Salvelinus namaycush*) at different concentrations, water temperatures, water hardnesses, and pH's. Recommends maximum safe concentrations. Alevin survival and fry growth were also studied.

98. WELLS, L. 1980. Food of alewives, yellow perch, spottail shiners, trout-perch, and slimy and fourhorn sculpins in southeastern Lake Michigan. 12 pp.

    Stomachs of 1,064 alewives (*Alosa pseudoharengus*), 1,103 yellow perch (*Perca flavescens*), 246 spottail shiners (*Notropis hudsonius*), 288 trout-perch (*Percopsis omiscomaycus*), 454 slimy sculpins (*Cottus cognatus*), and 562 fourhorn sculpins (*Myoxocephalus quadricornis*) from Lake Michigan were examined for food contents.

99. MCADA, C. W., AND R. S. WYDOSKI. 1980. The razorback sucker, *Xyrauchen texanus*, in the Upper Colorado River Basin, 1974–76. 15 pp.

    Surveys razorback sucker (*Xyrauchen texanus*) populations in the upper Colorado River. Includes data on spawning season, estimated fecundity, sizes, and estimated ages.

100. TIMMONS, T. J., W. L. SHELTON, AND W. D. DAVIS. 1980. Gonad development, fecundity, and spawning season of largemouth bass in newly impounded West Point Reservoir, Alabama–Georgia. 6 pp.

    Presents results of a study on largemouth bass (*Micropterus salmoides*) in 1977. Includes discussion of percentage of body weight contributed by ovaries and frequency distributions of ovarian egg diameters as indicators of spawning season.

101. NELSON, W. R. 1980. Ecology of larval fishes in Lake Oahe, South Dakota. 18 pp.

    The time and location of spawning, food of larvae, and habitats used as nursery areas by young-of-the-year fishes were studied from 1972 to 1975 in South Dakota waters of Lake Oahe, a main-stem Missouri River reservoir. Sampling locations were in the tributary rivers—the Grand, Moreau, and Cheyenne—and their embayments. Makes management recommendations for ensuring adequate reproduction of most fishes.

102. KELLY, G. A., J. S. GRIFFITH, AND R. D. JONES. 1980. Changes in distribution of trout in Great Smoky Mountains National Park, 1900–1977. 10 pp.

    Compares and contrasts distributions of brook trout (*Salvelinus fontinalis*), rainbow trout (*Salmo gairdneri*), and brown trout (*S. trutta*) from 1900–77. Predicts future distribution trends.

103. JOHNSON, B. T. 1980. Laboratory procedure for estimating residue dynamics of xenobiotic contaminants in a freshwater food chain. 16 pp.

    A laboratory method of measuring accumulation, transfer, elimination, and degradation of xenobiotic contaminants is described for organisms in a freshwater food chain (microorganisms, filter-feeder, and fish). A flow-through diluter-system, ^{14}C-labeled contaminants, gas and thin-layer chromatography, autoradiography, and liquid scintillation spectrometry are used in making residue determinations. Accumulation factors and various index values are developed for measuring and estimating potential accumulation of xenobiotic contaminants by aquatic organisms.

104. SANDERS, H. O., D. F. WALSH, AND R. S. CAMPBELL. 1981. Abate: effects of the organophosphate insecticide on bluegills and invertebrates in ponds. 6 pp.

    Application of the organophosphate insecticide Abate 3 times to duplicate 0.04-ha earthen ponds at 18 g/ha (4 μg/L)—the recommended application rate—and 180 g/ha (40 μg/L) was studied for effects on bluegill (*Lepomis macrochirus*) mortality, reproduction, brain acetylcholinesterase (AChE) activity, and growth. Biomass of invertebrates was also examined.

105. GREAT LAKES FISHERY LABORATORY. 1981. Chlorinated hydrocarbons as a factor in the reproduction and survival of lake trout (*Salvelinus namaycush*) in Lake Michigan. 42 pp.

    Presents and discusses results of studies on performance and survival of fry hatched from eggs of Lake Michigan lake trout (*Salvelinus namaycush*) exposed for 6 months to PCB's and DDE at concentrations similar to those present in offshore waters and zooplankton of Lake Michigan. Evaluates fry mortality, growth, swimming performance, predator avoidance, temperature preference, and metabolism.

106. VOGELE, L. E. 1981. Reproduction of smallmouth bass, *Micropterus dolomieui*, in Bull Shoals Lake, Arkansas. 15 pp.

Smallmouth bass (*Micropterus dolomieui*) were studied in Bull Shoals Lake to determine the nesting requirements and reproductive capabilities of the species in a reservoir. Underwater observations were conducted weekly in five study areas during the spawning seasons of 1969–76.

107. JOHNSON, B. T., EDITOR. 1982. Impact of xenobiotic chemicals on microbial ecosystems. 36 pp.

Environmental microbiology testing includes both the effect of microorganisms and microbial processes on chemical substances and the effect of chemical substances on microorganisms and microbial processes. Discusses environmental relevance, types, and ecological significance of microbial effects testing that may be used in developing environmental risk assessments.

108. ROTTIERS, D. V., AND R. M. TUCKER. 1982. Proximate composition and caloric content of eight Lake Michigan fishes. 8 pp.

Presents results of tests on proximate composition (percentage lipid, water, fat-free dry material, ash) and caloric content of eight species of Lake Michigan fish: lake trout (*Salvelinus namaycush*), coho salmon (*Oncorhynchus kisutch*), lake whitefish (*Coregonus clupeaformis*), bloater (*C. hoyi*), alewife (*Alosa pseudoharengus*), rainbow smelt (*Osmerus mordax*), deepwater sculpin (*Myoxocephalus quadricornis*), and slimy sculpin (*Cottus cognatus*). Data are analyzed for sex and age variation, and variation between fish collected in different years.

109. WELLS, L., AND S. C. JORGENSON. 1983. Population biology of yellow perch in southern Lake Michigan, 1971–79. 19 pp.

Reports results of a study based mainly on gill-net collections of yellow perch (*Perca flavescens*) made during July and August 1971–79 in southern Lake Michigan. Includes data on geographical variation in abundance, average length, age classes, growth, weight, spawning season, and mortality.

110. SANDERS, H. O., M. T. FINLEY, AND J. B. HUNN. 1983. Acute toxicity of six forest insecticides to three aquatic invertebrates and four fishes. 5 pp.

Technical grade and field formulations of six experimental forest insecticides—methomyl, carbaryl, aminocarb, trichlorfon, fenitrothion, and acephate—were tested for acute toxicity against three species of aquatic invertebrates (a daphnid, *Daphnia magna*; scud, *Gammarus pseudolimnaeus*; and larvae of a midge, *Chironomus plumosus*), and four species of fish (bluegill, *Lepomis macrochirus*; rainbow trout, *Salmo gairdneri*; fathead minnow, *Pimephales promelas*; and channel catfish, *Ictalurus punctatus*).

111. ECK, G. W., AND L. WELLS. 1983. Biology, population structure, and estimated forage requirements of lake trout in Lake Michigan. 18 pp.

Data collected during successive years (1971–79) of sampling lake trout (*Salvelinus namaycush*) in Lake Michigan were used to develop statistics on lake trout growth, maturity, and mortality, and to quantify seasonal lake trout food and food availability. These statistics were then combined with data on lake trout year-class strengths and age-specific food conversion efficiencies to compute production and forage fish consumption by lake trout in Lake Michigan during the 1979 growing season.

Resource Publication

The *Resource Publication* series is a miscellaneous series for separately issued popular or instructional materials, lengthy reports, or material that requires numerous halftones or color illustrations. Typical subjects include guides, handbooks, manuals, historical reports, popular articles, bibliographies, and proceedings of nontechnical conferences or workshops. Several titles may be included under a single cover. Publications are usually typeset and have a standard size of 20 × 26 cm (7 7/8 × 10 1/4 in.). Intended audiences are research scientists, technically trained management personnel, and the lay public. The series was first issued in 1965.

1. Bureau of Sport Fisheries and Wildlife. 1965. National Wildlife Refuges, 1965. 23 pp.

   Presents the development of National Wildlife Refuges, refuge management and maintenance, refuge publication offices, and pertinent recent (1965) legislation. Discusses the role of refuges in the management of waterfowl, threatened species, whooping cranes (*Grus americana*), and outdoor recreation. Provides a map of the United States showing the locations of refuges.

2. Bureau of Sport Fisheries and Wildlife. 1965. Fishery management services annual report for 1964. 47 pp.

   Discusses the Division of Fishery Management Services programs with: 1) Federal areas and Indian Reservations, 2) military areas, 3) national forests, 4) national parks, and 5) Indian tribes. Describes additional cooperative studies dealing with 1) the Corps of Engineers aquatic plant control program, 2) pesticide surveillance on Interior, Indian, and other Federal lands, 3) flood damage in western Montana, and 4) an oil spill near Mochips, Washington.

3. Bureau of Sport Fisheries and Wildlife. 1965. Annual report for 1964, Cooperative Fishery Units. 32 pp.

   Discusses Cooperative Fishery Units and their projects for 1964.

4. Bureau of Sport Fisheries and Wildlife. 1971. Sport fishing U.S.A. 464 pp.

   Discusses the biology, behavior, and migrations of fish. Provides articles and personal accounts about fishing, techniques, fishermen, and different areas and types of fishing. Reviews the economics, problems, and future concerns of fishery management.

5. Anonymous. 1965. Bird vs. aircraft. 11 pp.

   Describes the conflicts between herring gull (*Larus argentatus*) populations and aircraft, and proposes a solution.

6. Yeager, L. E. 1965. Thirty years of Cooperative Wildlife Research Units, 1935–1965. 34 pp.

   Discusses the origin of cooperative units, their Congressional authority, administration, and support. Provides a list of units, cooperating State agencies, and leaders since each unit's establishment. Covers training and research activities, research opportunities, and how research results are made available. Shows how management agencies in 21 States have used unit work, and what the costs of unit research are.

7. Henegar, D. L. 1966. Minimum lethal levels of toxaphene as a piscicide in North Dakota lakes. 16 pp. [Also issued as *Investigations in Fish Control* 3]

   To determine the minimum levels of toxaphene lethal to fishes in prairie lakes and reservoirs, 16 North Dakota lakes—ranging from 6.3 to 915 acres—were treated in 1959 and 1960 with concentrations of toxaphene ranging from 0.005 to 0.035 ppm. Physical and chemical studies were made of each area, hydrological maps were prepared, and test netting was carried out before and after treatment.

8. Needham, R. G. 1966. Effects of toxaphene on plankton and aquatic invertebrates in North Dakota lakes. 16 pp. [Also issued as *Investigations in Fish Control* 4]

   The effects of low concentrations of toxaphene on plankton and larger invertebrates were studied in four North Dakota lakes (a fifth lake, untreated, was a control). *Brachionus, Keratella, Trichocerca, Asplanchna, Polyarthra, Conochiloides, Daphnia, Ceriodaphnia, Bosmina,* and *Cyclops* were dominant zooplankters.

9. Warnick, D. C. 1966. Growth rates of yellow perch in two North Dakota lakes after population reduction with toxaphene. 9 pp. [Also issued as *Investigations in Fish Control* 5]

   Growth rates of yellow perch (*Perca flavescens*) that survived a toxaphene treatment in Brush and

Long lakes in North Dakota were calculated by the scale method for the 1960 and 1961 growing seasons.

10. MAHDI, M. A. 1966. Mortality of some species of fish to toxaphene at three temperatures. 10 pp. [Also issued as *Investigations in Fish Control* 6]

    Lethal concentrations of toxaphene were determined for the central stoneroller (*Campostoma anomalum*), golden shiner (*Notemigonus crysoleucas*), goldfish (*Carassius auratus*), black bullhead (*Ictalurus melas*), and bluntnose minnow (*Pimephales notatus*) in water at 53, 63, and 73°F. Rainbow trout (*Salmo gairdneri*) were tested at 53°F. The TL_m and LD50 were obtained by graphic methods. For comparison a normit method was used with the bluntnose minnow data.

11. GAYLORD, W. E., AND B. R. SMITH. 1966. Treatment of East Bay, Alger County, Michigan, with toxaphene for control of sea lampreys. 7 pp. [Also issued as *Investigations in Fish Control* 7]

    An experiment was conducted to determine whether toxaphene could be used to eradicate lake-dwelling sea lampreys (*Petromyzon marinus*) and to determine its effect on fish populations. In East Bay, a 78-acre lake on the Sucker River, Alger County, Michigan, an estimated concentration of 100 ppb was maintained for 14 days.

12. MEEHAN, W. R., AND W. L. SHERIDAN. 1966. Effects of toxaphene on fishes and bottom fauna of Big Kitoi Creek, Afognak Island, Alaska. 9 pp. [Also issued as *Investigations in Fish Control* 8]

    Big Kitoi Creek, on Afognak Island, Alaska, was treated with toxaphene in July 1961 to remove sculpins (*Cottus aleuticus*) predaceous on pink salmon fry (*Oncorhynchus gorbuscha*). Dispersion and penetration of toxaphene into the streambed were determined, as well as time required for detoxification. Numbers, weight, recruitment, and species composition of bottom fauna, insects, and other invertebrate groups were also monitored.

13. WALKER, C. R., R. J. STARKEY, AND L. L. MARKING. 1966. Relation of chemical structure to fish toxicity in nitrosalicylanilides and related compounds. 12 pp. [Also issued as *Investigations in Fish Control* 9]

    Relations between chemical structures of salicylanilides and benzanilides and their toxicity to rainbow trout (*Salmo gairdneri*) and goldfish (*Carassius auratus*) were evaluated in standard, static bioassays. Single and multiple substitutions of alkyl-, nitro-, and halo-groups were tested.

14. MARKING, L. L. 1966. Evaluation of *p,p'*DDT as a reference toxicant in bioassays. 10 pp. [Also issued as *Investigations in Fish Control* 10]

    *p,p'*DDT was tested as a reference standard toxicant against 19 species of freshwater fish, including 39 lots from 10 sources. The rapidity, nonselectivity, and consistency of its toxicity to fish were evaluated in 96-h static bioassays.

15. SCHOETTGER, R. A., AND A. M. JULIN. 1966. Evaluation of an electronic method of measuring hematocrits of fish. 11 pp. [Also issued as *Investigations in Fish Control* 11]

    Investigates 1) the comparability of YSI (Yellow Springs Instrument Company) electronic and centrifuge methods for measuring hematocrits in fish, 2) the reproducibility of electronic hematocrits, and 3) some physiological variables in fish blood that could influence conductivity—specifically, electrolyte and protein concentrations.

16. BUREAU OF SPORT FISHERIES AND WILDLIFE AND THE UNIVERSITY OF ALASKA, COOPERATORS. 1966. Proceedings of the first international scientific meeting on the polar bear. 72 pp.

    Discusses polar bear (*Ursus maritimus*) biology and life history, and management and research in Canada, Greenland, Norway, U.S.S.R., and Alaska. Considers future and international research and management needs. Provides a list of participants and presents resolutions adopted at the meeting.

17. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1966. Progress in sport fishery research, 1965. 120 pp.

    Describes fishery research efforts in the following areas: 1) pathology; 2) nutrition; 3) husbandry methods with trout, salmon, and warmwater species; 4) pesticide hazards and control; 5) reservoir and marine environments, and 6) genetics. Provides a list of publications, manuscripts in press, special reports, and useful addresses.

18. MARKING, L. L. 1967. Toxicity of MS-222 to selected fishes. 10 pp. [Also issued as *Investigations in Fish Control* 12]

    Toxicity of MS-222 to rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), brook trout (*Salvelinus fontinalis*), lake trout (*S. namaycush*), northern pike (*Esox lucius*), bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), and walleye (*Stizostedion vitreum*) of various sizes was determined in 15-,30-, and 60-min and 24-, 48-, and 96-h static bioassays at selected temperatures. Safety indexes were calculated on the basis of the brief exposures.

19. SCHOETTGER, R. A., AND A. M. JULIN. 1967. Efficacy of MS-222 as an anesthetic on four salmonids. 15 pp. [Also issued as *Investigations in Fish Control* 13]

    MS-222 was tested for its efficacy as an anesthetic for rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), brook trout (*Salvelinus fontinalis*), and lake

trout (*S. namaycush*). Efficacy was determined according to fish size, pH, and water hardness.

20. WALKER, C. R., AND R. A. SCHOETTGER. 1967. Method for determining MS-222 residues in fish. 10 pp. [Also issued as *Investigations in Fish Control* 14]

    Describes and discusses a modified Bratton-Marshall method for detecting MS-222 in fish tissues.

21. WALKER, C. R., AND R. A. SCHOETTGER. 1967. Residues of MS-222 in four salmonids following anesthesia. 11 pp. [Also issued as *Investigations in Fish Control* 15]

    Residues of MS-222 (tricaine methanesulfonate) in the blood, muscle, liver, and kidney of rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), brook trout (*Salvelinus fontinalis*), and lake trout (*S. namaycush*) were measured by a modified Bratton-Marshall colorimetric method. Temperatures were 7, 12, and 17°C in waters with total hardnesses of 10 to 180 ppm.

22. SCHOETTGER, R. A. 1967. Annotated bibliography on MS-222. 15 pp. [Also issued as *Investigations in Fish Control* 16]

    Contains 86 selected references on uses of MS-222 on cold-blooded animals including fish and amphibians. Most references are annotated.

23. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1966. Wildlife research: problems, programs, progress, 1965. 102 pp.

    Describes the Division of Wildlife Research programs and new (1965) research facilities in Denver, Colorado; Gainesville, Florida; and Jamestown, North Dakota. Discusses research highlights of 1965 in: 1) waterfowl management; 2) other migratory birds; 3) upland wildlife ecology; 4) pesticide-wildlife relations; 5) wildlife diseases and parasites; 6) animal control methods; 7) classification, distribution, and life history; 8) Cooperative Wildlife Research Units; 9) rare and endangered wildlife; and 10) extramural Division-financed research.

24. FORE, P. 1966. Cumulative subject and author index to *The Progressive Fish-Culturist*. 21 pp.

25. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1966. Annual report for 1965, Division of Fish Services. 54 pp.

    Reports on fishery management programs on Federal lands and Indian Reservations. Other cooperative projects include: 1) pesticide surveillance; 2) Mississippi River; 3) Truckee River Basin, Nevada; 4) Colorado River Storage Project, 5) Potomac River; 6) Merritt Reservoir, Nebraska; 7) South Dakota lakes; 8) coal mining operations' effects on fisheries; 9) East Tennessee project; 10) Susquehanna River; and 11) rare and endangered fishes. Briefly discusses cooperative fishery units, extension, and training.

26. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1966. Annual report for 1965, Cooperative Fishery Units. 69 pp.

    Provides unit locations and map of unit distribution. Describes objectives and training opportunities. Summarizes 1965 activities for 14 States. Lists unit personnel publications and papers.

27. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1966. National survey of fishing and hunting, 1965. 76 pp.

    Presents in graphs and in tables the results of an extensive survey. Data include number of anglers and hunters, their ages, favorite type of fishing and hunting, miles traveled, and expenditures. Briefly discusses how the survey was performed, and provides a statistical reliability analysis of the survey.

28. ANONYMOUS. 1966. American eagles and their economic status, 1964. 96 pp.

    Discusses the golden eagle (*Aquila chrysaetos*), its distribution, habitat, and food preferences. Examines golden eagle predation on rabbits, rodents, pronghorns (*Antilocapra americana*), deer, bighorn sheep (*Ovis canadensis*), upland game birds, waterfowl, domestic sheep, and cattle. Makes recommendations for management.

29. STEFFERUD, A., AND A. L. NELSON, EDITORS. 1966. Birds in our lives. 561 pp.

    Includes chapters on bird biology, birds in literature and art, birds in sports and recreation, ecology, husbandry, man's effects on birds, bird-human conflicts and possible solutions to those conflicts, and protective laws.

30. YEAGER, L. E., EDITOR. 1966. The making of a wildlifer: a symposium. 64 pp.

    Presents the following papers: 1) Wildlife and wildlife improvement; 2) Selection of students for graduate training in fisheries and wildlife; 3) Course work: basic, supporting, applied; 4) Training technicians and professionals for natural resources management; 5) What a State conservation department expects from a Cooperative Research Unit; 6) Giving wildlife employees professional opportunity; and 7) The "big needs" in wildlife research and training.

31. MALOY, C. R., AND H. WILLOUGHBY. 1967. Rearing marketable channel catfish in ponds. 4 pp.

    Discusses the following aspects of rearing channel catfish (*Ictalurus punctatus*) in ponds: 1) water supply, 2) holding facilities, 3) pond specifications, and 4) rearing procedures. Offers other sources of information and publications.

32. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1967. National Wildlife Refuges, 1966. 28 pp.

    Provides a map of the United States showing locations of National Wildlife Refuges, and lists new

(1965) refuges. Discusses the refuges and Canada geese (*Branta canadensis*), Alaskan refuges, waterfowl production areas, birdwatching, endangered species, the Great Swamp refuge in New Jersey, products of refuge management, flood and storm damages, 1965 recreational use, and Job Corps Conservation Centers on refuges.

33. SCHOETTGER, R. A., C. R. WALKER, L. L. MARKING, AND A. M. JULIN. 1967. MS-222 as an anesthetic for channel catfish: its toxicity, efficacy, and muscle residues. 14 pp. [Also issued as *Investigations in Fish Control* 17]

    MS-222 was tested as an anesthetic on channel catfish (*Ictalurus punctatus*). The influences of duration of exposure, size of fish, temperature, and water quality on toxicity, efficacy, and residues are discussed.

34. COMMITTEE ON RARE AND ENDANGERED WILDLIFE SPECIES. 1966. Rare and endangered fish and wildlife of the United States. 157 pp.

    Lists vertebrate animals that are considered rare or in danger of extinction. Includes mammals, birds, reptiles and amphibians, and fishes of the United States, the Commonwealth of Puerto Rico, and the Virgin Islands.

35. WILLFORD, W. A. 1967. Toxicity of 22 therapeutic compounds to six fishes. 10 pp. [Also issued as *Investigations in Fish Control* 18]

    Twenty-two therapeutic chemicals (18 parasiticides and 4 oral bacteriostats) were tested by bioassays for toxicity to fish. Tests were in 24- and 48-h static bioassays on rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), brook trout (*Salvelinus fontinalis*), lake trout (*S. namaycush*), and bluegill (*Lepomis macrochirus*) at 12°C, and channel catfish (*Ictalarus punctatus*) at 17°C.

36. MARKING, L. L., AND J. W. HOGAN. 1967. Toxicity of Bayer 73 to fish. 13 pp. [Also issued as *Investigations in Fish Control* 19]

    Provides and discusses results of study on Bayer 73, a molluscicide sold commercially as Bayluscide, and its toxicity to 18 freshwater fish species. Various temperatures, water qualities and pH's were tested. Discusses biodegradability, efficacy, and relative safety of Bayer 73 in conjunction with its usefulness as a general fish toxicant.

37. WILLFORD, W. A. 1967. Toxicity of dimethyl sulfoxide (DMSO) to fish. 8 pp. [Also issued as *Investigations in Fish Control* 20]

    Toxicities of dimethyl sulfoxide (DMSO) to rainbow trout, (*Salmo gairdneri*), brook trout (*Salvelinus fontinalis*), lake trout (*S. namaycush*), carp (*Cyprinus carpio*), black bullhead (*Ictalurus melas*), channel catfish (*I. punctatus*), green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), and yellow perch (*Perca flavescens*) were determined in 24-, 48-, and 96-h static bioassays at 12°C. Toxicity was low, around 30 ppt.

38. HESSELBERG, R. J., AND R. M. BURRESS. 1967. Labor-saving devices for bioassay laboratories. 8 pp. [Also issued as *Investigations in Fish Control* 21]

    Three inexpensive pieces of labor-saving apparatus for bioassay laboratory use are described and illustrated. Construction features, material costs, and use of a jar rinser, automatic liquid measuring vessel, and jar emptier are discussed.

39. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1967. Progress in sport fishery research, 1966. 195 pp.

    Reports progress in research of fish ecosystems, fish husbandry, pest control, and pesticide pollution. Provides a list of recent publications, manuscripts in press, special reports, and useful addresses.

40. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1967. Division of Fishery Services, annual report for 1966. 55 pp.

    Describes fishery management programs in Federal areas and Indian Reservations. Briefly discusses Cooperative Fishery Units, cooperation with the Division of Fish Hatcheries, and a national survey of needs for hatchery fish. Additional cooperative projects discussed are: 1) pesticide field appraisal, 2) aquatic plant control, 3) Federal Water Pollution Control Administration, 4) Upper Mississippi River Conservation Committee, 5) East Tennessee Management Project, 6) Colorado River Storage Project, and 7) rare and endangered fishes.

41. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1967. Annual report for 1966, Cooperative Fishery Units. 80 pp.

    Updates *Resource Publication* 26 (1966). Includes programs in 23 States.

42. ANONYMOUS. 1967. 15 years of better fishing: fish restoration program. 32 pp.

    Tests were conducted with both tap and pond waters in aquariums and with stream water in plastic-lined pools to determine whether manipulation of hydrogen-ion concentration of the water could be used to selectively kill bluegills (*Lepomis macrochirus*) in farm-pond fish populations consisting of bluegills and largemouth bass (*Micropterus salmoides*). The pH was changed by adding hydrochloric acid, acetic acid, sodium hydroxide, and calcium hydroxide; tests were carried out in the pH range of 3.3 to 11.2.

43. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1967. Wildlife research: problems, programs, progress, 1966. 117 pp.

    Updates *Resource Publication* 23 (1966).

44. HOTCHKISS, N. 1967. Underwater and floating-leaved plants of the United States and Canada. 124 pp.

    Describes all of the wild flowering plants, ferns, liverworts, and Characeae in which the foliage is habitually underwater or floating, and all those which have underwater or floating-leaved forms, and which, at the same time, have characteristics by which a person can tell them apart with the naked eye.

45. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1967. National Wildlife Refuges, 1967. 16 pp.

    Describes the National Wildlife Refuge system and provides a list of new (1966) refuges and a map of the refuge system. Discusses refuges and endangered species, The Endangered Species Preservation Act, refuge wildernesses, colonial birds and island refuges, 1966 recreational uses, soil and moisture conservation, and Job Corps Conservation centers.

46. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. Denver Wildlife Research Center. 24 pp.

    Describes research in the following areas: 1) bird pests, 2) mammal pests, 3) rodents, 4) coyote (*Canis latrans*) control, 5) golden eagles (*Aquila chrysaetos*), 6) safer pesticides, 7) foreign country aid, 8) botulism in waterfowl, and 9) birds and mammals on public lands.

47. BUREAU OF SPORT FISHERIES AND WILDLIFE. n.d. Fish and wildlife programs, 1968. 20 pp.

    Discusses the role of Bureau of Sport Fisheries and Wildlife programs in recreational use, national fish hatchery production, waterfowl use days, and economic and social benefits.

48. DEVANEY, T. E. 1968. Chemical vegetation control manual for fish and wildlife management programs. 42 pp.

    Discusses the use of herbicides and provides herbicide information sheets for various herbicides, describing chemical, physical, and biological properties of the herbicides. Gives common names for chemicals used with herbicides. Lists herbicides registered in accordance with The Federal Insecticide, Fungicide, and Rodenticide Act for use in aquatic sites.

49. BUMP, G. 1968. Foreign game investigations; a Federal–State cooperative program. 14 pp.

    Describes the foreign game introduction program. Discusses the need for the program, early introductions, and 26 species of game birds recommended for introduction. Offers current status of introductions already accomplished.

50. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. Sierra Nevada Aquatic Research Laboratory. 2 pp.

    Descriptive brochure.

51. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. Tiburon Marine Laboratory. 2 pp.

    Descriptive brochure.

52. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. The Salmon-Cultural Laboratory. 2 pp.

    Descriptive brochure.

53. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. Atlantic marine game fish research, Sandy Hook Marine Laboratory, Narragansett Marine Game Fish Laboratory. 8 pp.

    Brochure; describes the Sandy Hook Marine Laboratory, New Jersey, and the Atlantic Coast research program.

54. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. Bear River Migratory Bird Refuge, a visitor information booklet and tour guide. 22 pp.

55. ANONYMOUS. 1968. Suitability of the Susquehanna River for restoration of shad. 60 pp.

    Discusses the administrative committee and reports the biological findings: 1) studies of American shad (*Alosa sapidissima*) egg and larval stages (1963–65), 2) studies of young shad (1963–65), and 3) studies of adult shad. Discusses water quality, availability of food, availability of suitable substrate for egg development, shad emigration hazards, and adult shad behavior.

56. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. This is a salmon hatchery helping to maintain important sport and commercial fisheries. 8 pp.

    Describes salmon, their biology, and the processes of a salmon hatchery.

57. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. This is a trout hatchery, operated by Bureau of Sport Fisheries and Wildlife to help manage our sport fishery resources and provide recreation for millions of Americans. 8 pp.

    Describes trout life history and hatchery procedures.

58. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. This is a pondfish hatchery, operated by Bureau of Sport Fisheries and Wildlife to help manage our sport fishery resources and provide recreation for millions of Americans. 8 pp.

    Descriptive brochure.

59. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. Six questions everybody asks at National Fish Hatcheries. 2 pp.

    Brochure; discusses breeding, stocking, and feeding.

60. MCGILREY, F. B. 1968. A guide to wood duck production habitat requirements. 32 pp.

    Brochure; describes the requirements for breeding habitat and brood-rearing habitat. Discusses

factors that limit habitat, nest boxes, and research needs. Includes list of references.

61. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. Division of Fishery Services, annual report for 1967. 56 pp.

    Discusses fishery management programs on Federal areas and Indian reservations. Other cooperative projects include: 1) effects of mineral mining in fisheries; 2) water quality standards; 3) pesticide field appraisal, monitoring, and research; 4) aquatic weed control; 5) coordination projects; 6) Dale Hollow Reservoir investigations; and 7) Colorado River storage projects. Reports on a national survey of needs for hatchery fish and on cooperative fishery units.

62. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. Annual report for 1967, Cooperative Fishery Units. 63 pp.

    Updates *Resource Publication* 41 (1967).

63. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. State by State summaries: national survey of needs for hatchery fish, Parts 1 and 2. 71 pp. (part 1) and various pagings (part 2).

    Presents the results of a survey conducted in 1966 on 1) amount and type of sport-fish habitat, 2) amount and type of habitat stocked, 3) number and type of fishermen, 4) stocking requirements, and 5) hatchery fish production capabilities. Part 1 discusses the survey on nationwide basis; Part 2 discusses the survey State by State.

64. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. Progress in sport fishery research 1967. 220 pp.

    Reports on progress in the Division of Fishery Research in the following areas: 1) fish husbandry research, 2) pest control research, and 3) oceanic and reservoir ecosystems and fish research. Lists publications, manuscripts in press, special reports, and useful addresses.

65. BOCCARDY, J. A., AND W. M. SPAULDING, JR. 1968. Effects of surface mining on fish and wildlife in Appalachia. 20 pp.

    Describes the history of Appalachian surface mining, the extent and nature of disturbed areas, the effects of such mining on fish and wildlife, and esthetics. Discusses the existing conditions in Alabama, Kentucky, Maryland, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. Mentions reclamation accomplished and provides general recommendations.

66. MEYER, F. P. 1968. Treatment tips: how to determine quantities for chemical treatments in fish farming. 17 pp.

67. DEUEL, D. G., AND J. R. CLARK. 1968. The 1965 salt-water angling survey. 51 pp.

    Reports the results of a 1965 survey of salt water anglers regarding species caught, number and average weight of fish caught, geographical region, principal area, and method of fishing. Critiques the methods of survey, classifies species groups, and provides an index of common names.

68. ANONYMOUS. n.d. Effects of surface mining on the fish and wildlife resources of the United States. 51 pp.

    Discusses survey techniques; the history, types, extent, and location of surface mining; and ownership of surface-mined lands. Describes changes in fish and wildlife habitat—specifically physical changes in the land, in water quality and quantity, and in biology. Reports on past reclamation and makes recommendations.

69. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1970. The right to exist: a report on our endangered wildlife. 12 pp.

    Describes extinction and mentions specific examples of endangered mammals, birds, and fish. Discusses the new (1970) endangered species program, cooperative programs, regulations, education, and economics of endangered species.

70. HEWSTON, J. G., AND D. R. FRANKLIN. 1969. Recreational use patterns at Flaming Gorge Reservoir, 1963–65. 80 pp.

    Activities, characteristics, and satisfactions of recreationists at Flaming Gorge Reservoir, Utah–Wyoming, were studied in 1963–1965. Data were collected from interviews, questionnaires, creel censuses, and administrative agency records. Activities included sightseeing and rainbow trout (*Salmo gairdneri*) fishing.

71. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. National Wildlife Refuges, 1968. 16 pp.

    Describes National Wildlife Refuge System and lists new (1967) refuges. Discusses waterfowl, game, wildlife, and endangered species on refuges. Reports on research, special programs, administration, and publications of refuges.

72. GREENHALL, A. M., AND J. L. PARADISO. 1968. Bats and bat banding. 47 pp.

    Seeks to standardize bat-banding procedures and to stimulate public interest. Discusses history of bat banding, bat roost location, collection methods, holding cages, banding techniques, health hazards, data, and recording data. Recovery and preservation information, and a checklist of North American bats are provided.

73. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1968. Laboratories for fish disease research. Brochure; describes laboratories and research in general. 8 panels.

74. Bureau of Sport Fisheries and Wildlife. 1969. Wildlife research: problems, programs, progress, 1967. 104 pp.

    Updates *Resource Publication* 43 (1967). Includes birdbanding research.

75. Anonymous. 1969. Whooping cranes. 100 pp.

    Describes whooping cranes (*Grus americana*), their biology and life history, and research efforts.

76. Anonymous. 1969. Parasites and diseases of warm-water fishes. 20 pp.

    Presents some of the more common parasites and diseases of fish in fish farming reservoirs.

77. Bureau of Sport Fisheries and Wildlife. 1969. Progress in sport fishery research, 1968. 259 pp.

    Reports progress by the Division of Fishery Research in the following areas: 1) oceanic and reservoir ecosystem research, 2) pest control research, and 3) fish husbandry research. Provides list of publications, manuscripts in press, special reports, and useful addresses.

78. Sharpe, F. P., and W. T. Burkhard. 1969. A lightweight backpack high-voltage electrofishing unit. 8 pp.

    Describes lightweight portable equipment for collecting fish in almost inaccessible high mountain streams. The equipment includes a lightweight variable-voltage pulsating unit, a 110-V generator, a pack frame for mounting the equipment, and electrodes. Discusses the application and advantages of such equipment.

79. Bureau of Sport Fisheries and Wildlife. 1969. Division of Fishery Services: annual report for 1968. 60 pp.

    Describes and discusses fishery management programs on Federal areas, on Indian Reservations, with Cooperative Fishery Units, and in cooperation with the Division of Fish Hatcheries. Other cooperative projects include: 1) pesticide monitoring and appraisal, 2) effects of mineral mining on fisheries, 3) coordination projects, 4) Dale Hollow Reservoir investigation, 5) Choctawhatchee Bay striped bass study, and 6) rare and endangered fishes.

80. Bureau of Sport Fisheries and Wildlife. 1969. Cooperative Fishery Unit report for the period January 1968 through June 1969. 80 pp.

    Describes studies of 23 State Cooperative Fishery Units.

81. Bureau of Sport Fisheries and Wildlife. 1969. The Western Fish Nutrition Laboratory. 2 pp.

    Describes the laboratory and its research.

82. Bureau of Sport Fisheries and Wildlife. 1970. National Wildlife Refuges, 1969. 8 pp.

    Lists new (1968) National Wildlife Refuges and discusses waterfowl production areas, environmental interpretation, visitors, and products of refuge management. Mentions the Great Swamp National Wildlife Refuge wilderness area in New Jersey.

83. Bureau of Sport Fisheries and Wildlife. 1970. Report to the fish farmers. 123 pp.

    Presents an account of production and farming of food fish, bait fish, sport fish, and crayfish. Explains techniques, pertinent research, effects of research on fish farming, and future research needs. Provides a publication list.

84. Tucker, R. K., and D. G. Crabtree. 1970. Handbook of toxicity of pestides to wildlife. 131 pp.

    Acute toxicity data and a list of common symptoms observed are presented for each of 108 pesticides. For some, results of 30-day repeated oral toxicity or feeding tests are also included.

85. Bureau of Sport Fisheries and Wildlife. 1970. Wildlife research: problems, programs, progress, 1968. 112 pp.

    Updates Resource Publication 74 (1969). Includes sections on continuing research activities: 1) Cooperative Wildlife Research Units; 2) *Wildlife Review*; 3) birdbanding; 4) electronic data processing; 5) Bureau museum collection; 6) bat banding; and 7) identification services.

86. Evans, J. 1970. About nutria and their control. 65 pp.

    Describes nutria (*Myocastor coypus*), their history, biology, and reproduction. Discusses mortality and the sugarcane and rice damage problems. Explains when, where, and how to control nutria. Methods include chemical control (zinc phosphide), shooting, kill-trapping, live trapping, draining and grading, and vegetation control. Briefly discusses positive and negative values of nutria and competition with muskrats (*Ondatra zibethica*).

87. Aldrich, J. W. 1970. Review of the problem of birds contaminated by oil and their rehabilitation. 23 pp.

    Reviews: 1) history and scope of contamination, 2) methods of cleaning oiled birds, 3) toxicological and physiological effects of oil and related stresses on birds, 4) care of cleaned oiled birds, and 5) inducing premature molt in birds. Includes reference list.

88. Bureau of Sport Fisheries and Wildlife. 1970. Progress in sport fishery research, 1969. 284 pp.

    Reports progress by the Division of Fishery Research in the following research areas: pest control, animal husbandry, and oceanic and reservoir ecosystems. Includes current (1970) list of technical communications.

89. WEBB, R. T., AND F. R. RICHARDSON. 1970. Division of Fishery Services: annual report for 1969. 56 pp.

    Discusses fishery management programs on Federal areas, on Indian Reservations, with Cooperative Fishery Units, and with the Division of Fish Hatcheries. Describes pesticide field appraisal, monitoring, and research, and coordination projects. Summarizes fishery services in 15 tables.

90. KINNEY, E. C. 1970. Cooperative Fishery Unit report for the 1969–1970 school year. 60 pp.

    Updates *Resource Publication* 80 (1969).

91. DEES, L. T. 1970. Edible land snails in the United States. 8 pp.

    Provides regulations, classification, and description of land snails. Discusses reproduction, foods and feeding, habitat, locomotion, behavior, predators, and control. Lists and describes nine species.

92. STEWART, R. E., AND H. A. KANTRUD. 1971. Classification of natural ponds and lakes in the Glaciated Prairie region. 57 pp.

    Describes and explains a classification system and its application. Compares this system with that of Martin, et al., 1953. Lists characteristic plant species in prairie ponds and lakes. Provides representative photographs of all classes and some cover types of the system.

93. HOTCHKISS, N. 1970. Common marsh plants of the United States and Canada. 99 pp.

    Describes the emergent and semi-emergent plants most likely to be found in inland and coastal marshes. Omits hundreds of uncommon marsh plants and plants less characteristic of marshes than of marsh edges, lake and stream shores, or wet meadows. All plants are described and illustrated.

94. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1971. Wildlife Research: problems, programs, progress, 1969. 104 pp.

    Updates *Resource Publication* 85 (1970).

95. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1972. National survey of fishing and hunting, 1970. 108 pp.

    Presents the results of the 1970 fishing and hunting survey in graphs and in tables. Includes numbers and characteristics of hunters and anglers, expenditures, number of recreation days, number of trips, and miles traveled.

96. BROOKS, J. W., J. C. BARTONEK, D. R. KLEIN, D. L. SPENCER, AND A. S. THAYER. 1971. Environmental influences of oil and gas development in the Arctic Slope and Beaufort Sea. 24 pp.

    Describes the environmental characteristics and renewable resources of the Alaskan Arctic Slope and the Beaufort Sea in relation to oil and gas development. Problems associated with industrial activities are identified, and recommendations for avoiding or minimizing environmental and resource damage are advanced. It is noted that the simplicity of the ecosystems, the slow rate of organic processes, and the presence of permafrost create unique problems in connection with pollution, waste disposal, restoration of vegetation, and all activities that disturb the vegetated surface.

97. BUREAU OF SPORT FISHERIES AND WILDLIFE. n.d. National Wildlife Refuges, 1970. 16 pp.

    Provides the objectives of the National Wildlife Refuge system and discusses some general aspects of the system.

98. SMITH, A. G. 1971. Ecological factors affecting waterfowl production in the Alberta Parklands. 49 pp.

    Describes the study area and the methods and techniques of classification, vegetation sampling, and analysis; and breeding pair, brood, and nest censuses. Discusses habitat and vegetation, and land use and environmental changes. Discusses and provides data for breeding populations, nesting, and production.

99. STOUDT, J. H. 1971. Ecological factors affecting waterfowl production in the Saskatchewan Parklands. 58 pp.

    Describes the study area and the methods and techniques of classification, vegetation sampling, and analysis; and breeding pair, brood, and nest censuses. Discusses habitat and vegetation, and land use and environmental changes. Discusses and provides data for breeding populations, nesting, and production.

100. MEANLEY, B. 1971. Blackbirds and the southern rice crop. 64 pp.

    Describes the southern rice and rice-eating blackbirds: brown-headed cowbird (*Molothrus ater*), common grackle (*Quiscalus quiscula*), red-winged blackbird (*Agelaius phoeniceus*), and boat-tailed grackle (*Quiscalus major*). Covers bird migration and movements, and seasonal numbers, nesting, feeding, roosts, and foods. Discusses crop depredations and provides control methods: 1) cultural practices, 2) scaring, 3) chemical repellents, and 4) reducing populations.

101. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1971. Division of Fishery Services, annual report for 1970. 28 pp.

    Discusses Division of Fisheries objectives and programs. Summarizes by tables the fishery services provided on Federal areas, Indian Reservations, State–Federal cooperative areas, other public waters, and private waters. Includes data on acres

of habitat and miles of stream reclaimed or improved, pounds and numbers of hatchery fish, and man-days of fishing.

102. GAUDET, J. L., EDITOR. 1971. Report of the 1970 workshop on fish feed technology and nutrition. 207 pp.

Presents papers from three sections at the workshop: 1) fish food processing, 2) fish culture techniques, and 3) fish nutrition. [In English and French]

103. KINNEY, E. C., AND R. S. WYDOSKI. 1971. Cooperative Fishery Unit report for the 1970–71 school year. 50 pp.

Updates *Resource Publication* 90 (1970).

104. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1972. Wildlife research: problems, programs, progress 1970. 98 pp.

Updates *Resource Publication* 94 (1971).

105. ANDERSON, D. R., AND C. J. HENNY. 1972. Population ecology of the mallard: I. A review of previous studies and the distribution and migration from breeding areas. 166 pp.

Provides background information, including a review of the history of waterfowl management and a résumé of previous studies of the mallard (*Anas platyrhynchos*). The breeding range of the mallard was subdivided into 16 major and 44 minor reference areas. Each area is discussed in terms of habitat type, quantity of data available, importance to the continental mallard population, and previous waterfowl studies conducted within it. Locations and temporal distributions of band recoveries from mallards banded in each breeding area are presented on maps and in tables. Possible biases in using band recovery distributions for harvest distributions are outlined. Detailed tabulations of the locations of recoveries from bandings in each minor reference area are presented in an appendix.

106. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1970. Progress in sport fishery research, 1970. 318 pp.

Reports progress by the Division of Fishery Research in the following research areas: pest control, fish husbandry, and oceanic and reservoir ecosystems. Lists 1970 technical communications.

107. WHEELER, R. H., AND J. C. LEWIS. 1972. Trapping techniques for sandhill crane studies in the Platte River Valley. 19 pp.

Presents the results of a 1965–68 study of sandhill crane (*Grus canadensis*) trapping techniques. Discusses distribution and populations, habitat and behavior, development of capture techniques, trapping results, and band recoveries.

108. TOMLINSON, R. E. 1972. Review of literature on the endangered masked bobwhite. 28 pp.

Describes the masked bobwhite (*Colinus virginianus ridgwayi*), its discovery, and distribution. Discusses life history, habitat, food habits, reason for decline, and attempts at reintroduction and preservation.

109. FORTENBERY, D. K. 1972. Characteristics of the black-footed ferret. 8 pp.

Briefly discusses black-footed ferret (*Mustela nigripes*) numbers, distribution, identification, life history, and habits. Describes ferret signs and how to find ferrets.

110. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1971. Division of Fishery Services, annual report for 1971. 15 pp.

Describes Division of Fishery Services objectives and programs. Summarizes by table activities in all areas, including Federal areas and Indian Reservations. Presents some data by region. Updates *Resource Publication* 101 (1971).

111. HARRIS, V. T. 1972. Wildlife research 1971: problems, programs, progress. 106 pp.

Updates *Resource Publication* 85 (1970).

112. KINNEY, E. C. 1972. Cooperative Fishery Unit report for the 1971–72 school year. 80 pp.

Summarizes the Cooperative Fishery Unit programs in 25 States. Presents abstracts of completed theses from each unit.

113. MEYER, F. P., K. E. SNEED, AND P. H. ESCHMEYER, EDITORS. 1973. Second report to the fish farmers. 123 pp.

Presents an account of production and farming of food fish, bait fish, sport fish, and crayfish. Explains techniques, pertinent research, effects of research on fish farming, and future research needs. Provides a publication list. Updates *Resource Publication* 83 (1970).

114. OFFICE OF ENDANGERED SPECIES AND INTERNATIONAL ACTIVITIES. 1973. Threatened wildlife of the United States. 289 pp.

Data include: 1) distinguishing characteristics; 2) present (1973) and former distributions; 3) status and estimated numbers; 4) fecundity; 5) reasons for decline; 6) protective measures, present and future; 7) number in captivity; and 8) culture or breeding potential in captivity. Also provides references for each species.

115. POSPAHALA, R. S., D. R. ANDERSON, AND C. J. HENNY. 1974. Population ecology of the mallard: II. Breeding habitat conditions, size of the breeding populations, and production indices. 73 pp.

Provides information on mallard (*Anas platyrhynchos*) breeding habitat, size and distribution of breeding populations, and indices to production. The information is primarily the result of large-scale aerial surveys conducted during May and July, 1955–73. The history of conflict in resource use between agriculturalists and wildlife conservation interests in primary waterfowl breeding grounds is reviewed. The number of ponds present during the breeding season and the midsummer period and the effects of precipitation and temperature on those ponds are analyzed in detail.

116. GOLET, F. C., AND J. S. LARSON. 1974. Classification of freshwater wetlands in the glaciated Northeast. 56 pp.

Presents a classification system based on maximum wetland wildlife production and diversity. Describes life forms and subforms. Discusses wetland size, cover, interspersion, and surrounding habitat types, and includes additional descriptions. Mentions application of the system, and includes photographs of each class-subclass combination.

117. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1973. Wildlife Research Center, Denver, Colorado. Unpaged.

Brochure; briefly describes Denver Wildlife Research Center programs, including international activities, pesticides and environmental pollutants, coyote (*Canis latrans*) concerns, and animal control research.

118. STEPHENS, R. F. 1973. Division of Fishery Services, 1972 annual report. 28 pp.

Briefly describes Division of Fishery Services objectives and programs on Federal lands, Indian Reservations, and Federal–State cooperative areas. Includes information on Cooperative Fishery Units, and in particular discusses sea lamprey (*Petromyzon marinus*) control in the Great Lakes. Rare and endangered fishes, environmental monitoring, and field appraisals are also mentioned.

119. ANDERSON, D. R., P. A. SKAPTASON, K. C. FAHEY, AND C. J. HENNY. 1974. Population ecology of the mallard: III. Bibliography of published research and management findings. 46 pp.

Presents a bibliography of the following aspects of mallards (*Anas platyrhynchos*): 1) population ecology, 2) behavior, 3) genetics, 4) food and food habits, 5) habitat, 6) censuses and surveys, 7) pesticide research, 8) lead poisoning, and 9) disease.

120. ESCHMEYER, P. H., AND V. T. HARRIS. 1974. Bibliography of research publications of the U.S. Bureau of Sport Fisheries and Wildlife, 1928–1972. 154 pp.

121. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1973. Progress in Sport Fishery Research, 1971. 157 pp.

Reports progress by the Division of Fishery Research in the following research areas: pest control, fish husbandry, and oceanic and reservoir ecosystems. Includes a list of 1973 technical communications.

122. MCDONALD, M. E. 1974. Key to nematodes reported in waterfowl. 44 pp.

Provides a checklist of nematodes, a key to their families and genera, a guide to species identification, a key to species found in waterfowl, and a list of anatomical habitat of genera. Includes a reference list.

123. PHENICIE, C. K., AND J. R. LYONS. 1973. Tactical planning in fish and wildlife management and research. 19 pp.

Tactical objectives are identified and stated through a step-down plan, in which the appropriate activities for scheduling and management control are identified, and the need for experimental design in research is isolated.

124. NETSCH, N. F. 1975. Fishery resources of waters along the route of the trans-Alaska pipeline between Yukon River and Antigun Pass in North Central Alaska. 45 pp.

Fishery resources along a 185-mile segment of the trans-Alaska pipeline route between the Yukon River and Atigun Pass are described. Arctic grayling (*Thymallus arcticus*), slimy sculpin (*Cottus cognatus*), and round whitefish (*Prosopium cylindraceum*) were most common. Intensive mark and recapture studies were conducted on Jim River, Prospect Creek, and stream HR2-1405+92 in 1972. The number of fish and their movements are discussed.

125. ANDERSON, D. R. 1975. Population ecology of the mallard: V. Temporal and geographic estimates of survival, recovery, and harvest rates. 110 pp.

Estimates of survival, recovery, and harvest rates of mallards (*Anas platyrhynchos*) banded before the hunting season are analyzed. Annual estimates of survival, recovery and harvest rates, and their sampling variances are summarized for each age and sex in the appendix.

126. BRAUN, C. E., D. E. BROWN, J. C. PETERSON, AND T. P. ZAPATKA. 1975. Results of the Four Corners cooperative band-tailed pigeon investigation. 20 pp.

Provides the results of intensive studies conducted from June 1967 through October 1972 of band-tailed pigeons (*Columba fasciata*) breeding in the Four Corners States of Arizona, Colorado, New Mexico, and Utah. Discusses distribution, habitat, trapping and banding, migration patterns and chronology, mortality and survival, hunting, age composition of harvest, and crop gland development. Evaluates hunting and its impacts.

127. MEYER, F. P., AND G. L. HOFFMAN. 1976. Parasites and diseases of warmwater fishes. 20 pp.

Briefly describes and discusses freshwater fish diseases and how to diagnose them.

128. ANDERSON, D. R., AND K. P. BURNHAM. 1976. Population ecology of the mallard: VI. The effect of exploitation on survival. 66 pp.

Describes two hypotheses—hunting as additive or as compensatory mortality—and reviews laboratory and field studies supporting each hypothesis. Discusses invalid methods still in use and modern methods for testing these hypotheses. Results include: 1) time-varying survival rates, 2) survival in years of liberal and restrictive hunting regulations, 3) tests of additive versus compensatory mortality, 4) survival versus harvest rates, and 5) simulation studies. Discusses the implications of these results and future research needs.

129. BERGMAN, R. D., R. L. HOWARD, K. F. ABRAHAM, AND M. W. WELLER. 1977. Water birds and their wetland resources in relation to oil development at Storkersen Point, Alaska. 38 pp.

Presents the results of a 5-year study of the bird populations at Storkersen Point on the Alaska Coastal Plain. To provide insight into habitat use and to devise systems for protecting key habitats, wetlands were classified on the basis of size, depth, vegetation, and water chemistry. The resulting eight classes were then related to bird use. To determine factors influencing differential use of classes of wetlands, and to provide a basis for understanding the food relations and the problems of pollution of wetlands, invertebrate populations were examined in major freshwater wetlands. Recommendations for preservation of the tundra are made.

130. MARTIN, E. M., AND S. M. CARNEY. 1977. Population ecology of the mallard: IV. A review of duck hunting regulations, activity, and success, with special reference to the mallard. 137 pp.

Deals at length with the harvest of mallards (*Anas platyrhynchos*) by waterfowl hunters. Long-term summaries of duck hunting regulations (1948–1974), Migratory Bird Hunting Stamp sales (1934–1974), Hunter Questionnaire (1952–1974), Duck Wing Collection (1960–1974), and Hunter Performance (1965–1972) Survey data for the United States are presented and discussed. Similar data from Canada are also summarized. Mallard harvest figures for 1961–1974 are presented by Mallard Harvest Area, of which 100 are defined for the United States and 14 for Canada, as well as by State or Province and flyway. Age and sex compositions and the chronological distribution of the mallard harvest are examined in detail. Relations between duck hunting regulations and harvest and hunter behavior are examined briefly. A procedure for calculating expected hunter success under a wide variety of bag limit regulations is developed.

131. BROWNIE, C., D. R. ANDERSON, K. P. BURNHAM, AND D. S. ROBSON. 1978. Statistical inference from band recovery data—a handbook. 212 pp.

Presents a discussion of modern methods for the detailed analysis of certain types of marking studies of animal populations. The discussion and examples focus on birdbanding studies, which are a common and important application and permit a consistent terminology. The estimation methods and statistical testing procedures presented are potentially applicable to fish tagging experiments, entomological investigations, and studies of certain reptiles and amphibians. Presents and evaluates 14 models.

132. FLOOD, B. S., M. E. SONGSTER, R. D. SPARROWE, AND T. S. BASKETT. 1977. A handbook for habitat evaluation procedures. 77 pp.

The habitat requirements, preferred foods, cavity-forming trees (if applicable), references, and field forms for each habitat type are provided for: 1) forest game; 2) upland game; 3) tree squirrels; 4) terrestrial furbearers; 5) aquatic furbearers; and 6) waterfowl. All data and species listed are specifically for the Meramec Park Lake project in Crawford County, Missouri.

133. BASKETT, T. S., D. A. DARROW, D. L. HALLETT, M. J. ARMBRUSTER, J. A. ELLIS, B. F. SPARROWE, AND P. A. KORTE, EDITORS. 1980. A handbook for terrestrial habitat evaluation in central Missouri. 155 pp.

Follows the format of *Resource Publication* 132, but differs as follows: 1) the project area includes 11 counties in central Missouri, rather than the Meramec River basin; 2) evaluation elements are individual species instead of combinations of species; 3) evaluation elements now include nongame mammals and birds; 4) evaluation criteria are less subjective in the new handbook; 5) instead of field estimates, use of aerial photographs for certain criteria (e.g., distance to water) is suggested; and (6) habitat types are classified somewhat differently.

134. BURY, R. B., C. K. DODD, JR., AND G. M. FELLERS. 1980. Conservation of the amphibia of the United States: a review. 34 pp.

The conservation status of 39 species and subspecies of amphibians is assessed. Provides a brief description, geographic range (including a map), habitat, status, and recommendations for protection of each amphibian. The information is based on literature, personal communications, and field work.

135. WYDOSKI, R. S., K. GILBERT, K. SEETHALER, C. W. MCADA, AND J. A. WYDOSKI. 1980. Annotated bibliography for aquatic resource management of the Upper Colorado River ecosystem. 186 pp.

136. DOLBEER, R. A. 1980. Blackbirds and corn in Ohio. 18 pp.

Describes the status of the red-winged blackbird (*Agelaius phoeniceus*) and the common grackle (*Quiscalus quiscula*) and discusses their depredation on corn. Presents the legal status of blackbirds in Ohio, and discusses population management and an integrated management program for farmers. Makes management recommendations and provides sources of services and information.

137. JOHNSON, W. W., AND M. T. FINLEY. 1980. Handbook of acute toxicity of chemicals to fish and aquatic invertebrates. 98 pp.

Compiles results from toxicity tests on fish and aquatic invertebrates conducted at Columbia National Fisheries Research Laboratory in 1965–78. Studies include 1,587 acute toxicity tests on 271 chemicals against 28 species of fish and 30 species of invertebrates.

138. SAUNDERS, G. B., AND D. C. SAUNDERS. 1981. Waterfowl and their wintering grounds in Mexico, 1937–64. 151 pp.

Describes waterfowl wintering areas of Mexico. Discusses the yearly winter habitat conditions and waterfowl use for 1945–64 for the Gulf and Caribbean zone, the interior Highland zone, and the Pacific Coast zone. Presents migration, winter distribution, foods, habitats, band recoveries, and hunting mortality data for each waterfowl species encountered in Mexico.

139. BIRKENSTEIN, L. R., AND R. E. TOMLINSON. 1981. Native names of Mexican birds. 159 pp.

Includes English and Spanish common names.

140. GILMER, D. S., L. M. COWARDIN, R. L. DUVAL, L. M. MECHLIN, C. W. SHAIFFER, AND V. B. KUECHLE. 1981. Procedures for the use of aircraft in wildlife biotelemetry studies. 19 pp.

Airplane and helicopter antenna attachments are described. The performance of the receiving antenna system is discussed, with emphasis on how variables in aircraft type and antenna configuration may influence reception. Characteristics of receivers, transmitters, and antennas that might influence tracking are discussed. Specific topics such as calibration of receivers and transmitter quality control are considered. Suggestions in preparing for and conducting tracking flights that will improve overall efficiency and safety are presented. Search techniques, including procedures for conducting large and specific area surveys as well as methods to improve and evaluate search efficiency, are discussed. Considers special topics such as low-level operations and use of helicopters. Diagrams of antenna mounts, equipment check-off lists, and antenna test procedures are included as appendices.

141. DERKSEN, D. V., T. C. ROTHE, AND W. D. ELDRIDGE. 1981. Use of wetland habitats by birds in the National Petroleum Reserve—Alaska. 27 pp.

Distribution, abundance, and use of wetland habitats by migratory birds were studied at two interior and three outer Arctic Coastal Plain sites in the National Petroleum Reserve in Alaska (NPR-A) in 1977 and 1978. Comparative data were collected in the same years from a Beaufort Sea coastal site near Prudhoe Bay. Data include species composition and seasonal fluctuations in population densities. Makes recommendations for petroleum and production activities onshore and in the Beaufort and Chukchi seas.

142. MCDONALD, M. E. 1981. Key to trematodes reported in waterfowl. 156 pp.

Provides a checklist of trematodes, a list of the anatomical habitat of genera, a key to families and genera, a guide to identification of species, and keys to species found in waterfowl.

143. GREENHALL, A. M. 1982. House bat management. 33 pp.

Discusses the biology and ecology of insectivorous bats, and reviews nuisance problems, species causing them, and health hazards. Describes batproofing techniques that will provide effective and acceptable alternatives for dealing with house bat problems and hazards. Makes management recommendations and mentions future research needs.

144. FAANES, C. A. 1982. Avian use of Sheyenne Lake and associated habitats in central North Dakota. 24 pp.

A study of avian use of various habitats was conducted in the Sheyenne Lake region of central North Dakota during April–June 1980. Population counts of birds were made in wetlands of various classes, prairie thickets, upland native prairie, shelterbelts, and cropland. Data on dates of occurrence, nesting records, and habitat use are presented for the 175 species recorded in 1980. Observations of significance by refuge staff are also provided.

145. FRITTS, S. H. 1982. Wolf depredation on livestock in Minnesota. 11 pp.

Reviews wolf depredation, history of control programs, and problems in verification of gray wolf (*Canis lupus*) depredation. The 1979–80 approach to control and its results are discussed. The objective of this program was to reduce livestock losses while minimizing the number of wolves taken.

146. ANDERSON, S. H. 1982. Effects of the 1976 Seney National Wildlife Refuge wildfire on wildlife and wildlife habitats. 28 pp.

Discusses the fire pattern and intensity; structural changes that occurred in habitat; and changes in abundance and species of birds, mammals, amphibians, reptiles, and fish.

147. MUNRO, R. E., AND C. F. KIMBALL. 1982. Population ecology of the mallard: VII. Distribution and derivation of the harvest. 127 pp.

Banding records for 1961–1975 were used, together with information from previous reports in this series, to estimate annual and average preseason age and sex structure of the mallard (*Anas platyrhynchos*) population and patterns of harvest distribution and derivation. Distribution of the mallard harvest from 16 major breeding ground reference areas to States, Provinces, and flyways is tabulated and illustrated. Seasonal (weekly) breeding ground derivation of the harvest within States and Provinces from the 16 reference areas also is tabulated. Harvest distribution, derivation, and similarity of derivation between harvest areas are summarily illustrated with maps.

148. FREDRICKSON, L. H., AND T. S. TAYLOR. 1982. Management of seasonally flooded impoundments for wildlife. 29 pp.

Reviews the advantages and disadvantages of moist-soil management and presents development of moist-soil impoundments. Discusses management of seasonally flooded impoundments, water level manipulation for wildlife, and development of integrated management plans.

149. SCHNICK, R. A., J. M. MORTON, J. C. MOCHALSKI, AND J. T. BEALL. 1982. Mitigation and enhancement techniques for the Upper Mississippi River System and other large river systems. 714 pp.

Extensive information is provided on techniques that can reduce or eliminate the negative impact of man's activities (particularly those related to navigation) on large river systems, with special reference to the Upper Mississippi River. Discussions of each technique or group of techniques include 1) the situation to be mitigated or enhanced; 2) a description of technique; 3) impacts on the environment; 4) costs; and 5) an evaluation for use on the Upper Mississippi River System. The techniques are divided into four primary categories: bank stabilization techniques, dredging and disposal of dredged material, fishery management techniques, and wildlife management techniques.

150. YASUTAKE, W. T., AND J. H. WALES. 1983. Microscopic anatomy of salmonids: an atlas. 184 pp.

Includes 50 plates in black and white, supplemented by 12 in color, all with detailed captions. Many significant structures or areas are shown at high magnification. The text of each of the 13 chapters has generally been limited to introductory comments. A description of fixing procedures is provided.

151. FAANES, C. A., AND J. M. ANDREW. 1983. Avian use of forest habitats in the Pembina Hills of northeastern North Dakota. 24 pp.

During 1981 the avifauna of the upper valley of the Pembina River in the Pembina Hills was studied. Field work extended from 20 April to 23 July; breeding bird censuses were conducted 7 June to 2 July. Data include species composition, breeding populations, breeding densities, and species diversity.

152. SCHMAT, C. J., M. A. RIBICK, J. L. LUDKE, AND T. W. MAY. 1983. National Pesticide Monitoring Program: organochlorine residues in freshwater fish, 1976–79.

The U.S. Fish and Wildlife Service measured organochlorine residues in 620 whole fish samples collected from 109 stations nationwide in 1976–79, as part of the National Pesticide Monitoring Program.

153. HUDSON, R. H., R. K. TUCKER, AND M. A. HAEGELE. 1984. Handbook of toxicity of pesticides to wildlife. 90 pp.

Updates *Resource Publication* 84 (1970).

154. SHAW, W. W., AND W. R. MANGUN. 1984. Nonconsumptive use of wildlife in the United States. 20 pp.

Sections of the *1980 National Survey of Fishing, Hunting and Wildlife-Associated Recreation* that dealt with nonconsumptive uses of wildlife are analyzed. Data are based on 5,997 detailed personal interviews of Americans 16 years old and older who participated in some form of nonconsumptive use of wildlife. Represents the first detailed nationwide data base dealing with the characteristics of nonconsumptive users, the types of activities and wildlife involved, and the potential for development of new methods for funding nongame management.

155. BURY, R. B., AND J. A. WHELAN. 1984. Ecology and management of the bullfrog. 23 pp.

Summarizes and critically reviews information on the biology of the bullfrog (*Rana catesbeiana*) related to its ecology, present status, culture, and management. Includes recent, important biological and economic features of the bullfrog, as well as pertinent historical references.

156. BROWNIE, C., D. R. ANDERSON, K. P. BURNHAM, AND D. S. ROBSON. 1985. Statistical inference from band recovery data—a handbook. Second edition. 292 pp.

Presents a discussion of modern methods for the detailed analysis of certain types of marking studies of animal populations. The discussion and examples focus on birdbanding studies, which are a common and important application and permit a consistent terminology. The estimation methods and statistical testing procedures presented are potentially applicable to fish tagging experiments, entomological investigations, and studies of certain reptiles and amphibians. Presents and evaluates 14 models.

Wildlife Leaflet

The *Wildlife Leaflet* series primarily summarizes technical information for nontechnical readers. Each leaflet deals with a single subject such as inventory or survey results, management techniques (including animal damage control methods), and descriptions of wildlife and wildlife diseases. Publications are usually typeset and have a standard size of 20 × 27 cm (7 7/8 × 10 1/2 in.); length varies. Intended audiences are technically trained management personnel, natural resource managers, and the lay public. First issued in 1935 by the Bureau of Biological Survey (Department of Agriculture) as *Wildlife Research and Management Leaflet*, the series name was changed to *Wildlife Leaflet* (Department of the Interior, Bureau of Biological Survey) in 1939. Wildlife Leaflets are a continuation of the series under the same title established by the Biological Survey in 1939 (superseding the "BS-" series begun in 1935 and the "Bi-" series begun in 1915, and certain information leaflets in the "Form 3-" series begun in1939). It continued as *Wildlife Leaflet* under the Department of Interior, Fish and Wildlife Service. In 1985 the series was renamed *Fish and Wildlife Leaflet.*

1. KELSO, L. H. 1935. Winter food of ruffed grouse in New York. 3 pp.

   Food consumption of ruffed grouse (*Bonasa umbellus*) during winter in New York is discussed on the basis of stomach and crop analyses.

2. DIVISION OF WILDLIFE RESEARCH. 1935. Aids for bird students. 8 pp.

   Presents a bibliography to aid ornithology students in selecting suitable literature for their needs.

3. COTTAM, C. 1935. The present situation regarding eelgrass (*Zostera marina*). 7 pp.

   Presents status of eelgrass (*Zostera marina*) in 1935: history and extent of eelgrass disappearance, cause of decline, effects of disappearance, and past periods of scarcity. Conditions in 1935 are presented for Eastern bays and sounds, Delaware, Maryland, Virginia, North Carolina, New Jersey, New York, New England, Canada, and Europe.

4. DIVISION OF PUBLIC RELATIONS. 1937. Available publications of the Bureau of Biological Survey. 7 pp.

5. BELL, W. B., AND J. E. SHILLINGER. 1935. Tularemia, an animal-borne disease. 3 pp.

   Summarizes available information regarding tularemia, including the nature and history of the disease and symptoms in man and wild rabbits. Mentions other animals known to be susceptible and describes protective measures, including quarantine procedures.

6. DIVISION OF WILDLIFE RESEARCH. 1935. Publications on cage birds. Prepared in the Section of Food Habits. 9 pp.

   Presents bibliography on such cage birds as canaries and parakeets.

7. DIVISION OF GAME MANAGEMENT. 1935. Instructions for controlling bats. Prepared in the Section of Predator and Rodent Control. 1 p.

   Methods for controlling bats (including repelling, excluding, and fumigating) found in homes and other occupied buildings are described.

8. DIVISION OF WILDLIFE RESEARCH. 1935. Publications on attracting birds. Prepared in the Section of Food Habits. 4 pp.

9. SHILLINGER, J. E. 1935. Infectious diseases as a cause of loss in wildlife. 4 pp.

   Reports on investigations in Minnesota, Wisconsin, and Michigan regarding *Pasteurella tularense* in eastern cottontails (*Sylvilagus floridanus*), snowshoe hares (*Lepus americanus*), and ruffed grouse (*Bonasa umbellus*). Mentions ulcerative enteritis in ruffed grouse in Minnesota and blackhead in quail and wild turkey (*Meleagris gallopavo*).

10. GARLOUGH, F. E. 1935. The possibility of secondary poisoning from thallium used in the control of rodents. 2 pp.

    Discusses the possibility of secondary poisoning of birds and mammals that consume carcasses of animals killed by thallium sulphate. Lists lethal doses for mammals and birds and mentions secondary poisoning in man.

11. KNAPPEN, P. 1935. Birds aid blueberry and cranberry growers. 4 pp.

    Use of birds in the control of cranberry and blueberry insect pests is suggested. Insects include

caterpillars, gall midges, gall gnats, beetles, sawflies, katydids, crickets, and grasshoppers. A list of birds that feed on such insects from New England to New Jersey and Wisconsin is given.

12. SHELDON, H. P., O. J. MURIE, AND W. E. CROUCH. 1935. The present plight of the Jackson Hole elk. 4 pp.

    Discusses lack of winter range as a significant factor in the plight of the Jackson Hole, or North American, elk (*Cervus elaphus*). Winter feeding and other temporary measures are contrasted with a more permanent solution: acquisition of adequate winter range.

13. KALMBACH, E. R. 1935. Protecting grain crops from damage by wild fowl. 7 pp.

    Discusses nature of complaints involving destruction of grain crops by waterfowl. Obligations of farmers and the Federal government are identified; suggestions for crop protection are provided, including the use of firearms, fireworks, lights, flashguns, and herding geese.

14. MCATEE, W. L. 1935. Planting for wildlife in the corn belt. 2 pp.

    Discusses the need for planting vegetation, shrubs, and trees for use as wildlife food and cover in corn belt areas.

15. MCATEE, W. L. 1935. Planting for wildlife in the cotton belt. 2 pp.

    Discusses the need for planting vegetation, shrubs, and trees for use as wildlife food and cover in cotton belt areas.

16. DIVISIONS OF GAME MANAGEMENT AND MIGRATORY WATERFOWL. 1936. Bird refuges and big-game preserves administered by the Bureau of Biological Survey. 8 pp.

    Lists bird refuges and big game preserves administered by the Bureau of Biological Survey as of April 1936. List includes year of establishment of refuge or preserve, acreage, and species or groups of wildlife chiefly protected.

17. MCATEE, W. L. 1935. Wildlife of the Atlantic coast salt marshes. 22 pp.

    Lists birds, reptiles, fish, mammals, and plants of the salt marshes. Includes values of plants to wildlife and mentions zones of salt marsh plants. Intended for educational use in CCC camps engaged in mosquito control work in Atlantic coast salt marshes.

18. BUREAU OF BIOLOGICAL SURVEY. 1935. Federal regulations on hunting waterfowl explained. 4 pp.

19. MCATEE, W. L. 1935. Plants valuable for wildlife utilization and for erosion control. 11 pp.

    Lists uncultivated and crop plants useful for erosion control. Describes wildlife use of uncultivated plants for food and cover; lists most useful genera.

20. BASSETT, C. F. 1935. What shall we feed our pelters? 7 pp.

    Suggests feed alternatives for foxes raised for pelts. Describes a 1934 experiment conducted to determine value of dehydrated beef meal and liver meal as a complete substitute for raw meat in fox diet.

21. KELLOGG, C. E. 1935. Feed cost of producing young rabbits to weaning age. 3 pp.

    Feed costs of producing young rabbits are tabulated according to the results of two experiments conducted at the Rabbit Experiment Station, Fontana, California. Rabbits used were both red and white New Zealands.

22. KELLOGG, C. E. 1935. Feed requirements in raising weaned rabbits to a weight of six pounds. 4 pp.

    Gives feed requirements and costs of raising weaned rabbits to a weight of 6 pounds.

23. GRIMES, F. G. 1935. Abstract of fur laws,1935-36. 29 pp.

    Summarizes, by States, Territories, and Canadian Provinces, legal provisions regarding possession, sale, and shipment of pelts for 1935-36.

24. GRIMES, F. G. 1935. Bounties paid by States. 4 pp.

    Presents summary of bounties paid under 28 State laws for destroying wild animals and birds considered a menace to other forms of valuable wildlife, livestock, poultry, or private property.

25. ASHBROOK, F. G. 1935. Fur resources—the stepchild of conservation. 4 pp.

    Discusses the lack of management of valuable fur resources and recommends that the fur trade cooperate with management agencies to ensure the preservation of fur resources.

26. DIVISION OF WILDLIFE RESEARCH. 1935. Directions for poisoning pinon jays. Prepared in the Section of Food Habits. 2 pp.

    Describes corn and wheat damage by pinyon jays (*Gymnorhinus cyanocephalus*) in Rocky Mountain States. Suggests control measures, including preparation and distribution of poisoned bait.

27. ALDOUS, S. E. 1936. A cage trap useful in the control of white-necked ravens. 5 pp.

    Describes a cage trap useful in capturing Chihuahuan ravens (*Corvus cryptoleucus*) and designed for use in Texas, southern New Mexico, and Arizona.

28. DIVISION OF WILDLIFE RESEARCH. 1935. Feeding schedule for rabbits. Prepared in the Section of Fur Resources. 1 p.

Presents maintenance feeding rations for mature rabbits, and special rations for does that fail to kindle and for those suckling young. A sample feeding schedule for does and litters is given.

29. DIVISION OF WILDLIFE RESEARCH. 1935. Directions for preservation and care of material collected for food habits studies. Prepared in the Section of Food Habits. 5 pp.

    Proper methods of collecting, handling, preserving, and shipping stomachs and other materials for food habits studies are provided. Also discusses recording data and materials needed.

30. COTTAM, C. 1936. Economic ornithology and the correlation of laboratory and field methods. 13 pp.

    Discusses value of laboratory and field research and the need for both in investigations regarding birds and their interactions with man. Presents laboratory methods of examining stomachs of birds.

31. KELLOGG, C. E. 1936. Average weight of rabbits at weaning age. 5 pp.

    Gives distribution by weight of 1,903 rabbits weaned at 8 weeks. Also mentions weights of those weaned during different months and litter sizes of the rabbits.

32. DIVISION OF WILDLIFE RESEARCH. 1936. Raising badgers in captivity. Prepared in the Section of Fur Resources. 2 pp.

    Includes general description of the American badger (*Taxidea taxus*), suitable pens and dens, feeding directions and notes on breeding.

33. CHAPMAN, H. H. 1936. Forestry and game management. 4 pp.

    Suggests that coordination of game management with other uses of forests is a matter of proper land use and a function of the forester.

34. DIVISION OF WILDLIFE RESEARCH. 1936. Raising raccoons. Prepared in the Section of Fur Resources. 2 pp.

    Discusses the following aspects of raising raccoons (*Procyon lotor*): selecting ranch sites, preparing pens and dens, feeding, breeding, and managing.

35. DIVISION OF WILDLIFE RESEARCH. 1936. Raising muskrats. Prepared in the Section of Fur Resources. 2 pp.

    Discusses the following aspects of raising muskrats: pen raising, fencing marsh areas, breeding, definition of prime pelts, and general suggestions. Lists six publications on muskrats.

36. DIVISION OF WILDLIFE RESEARCH. 1936. Publications on fur and fur animals. Compiled in the Section of Fur Resources. 2 pp.

    Includes publications on fur animals, domestic rabbits, white mice and rats, and guinea pigs.

37. GABRIELSON, I. N. 1936. The correlation of forestry and wildlife management. 8 pp.

    To correlate forestry and wildlife management this publication suggests: 1) additions to average forestry school curriculum, 2) modifications in forestry management to correlate with wildlife needs, and 3) similar modifications in viewpoints and practices of biologists and conservationists.

38. BODE, I. T. 1936. Cooperative research in wildlife management—a summary of the project to February 15, 1936. 16 pp.

    Includes cooperating agencies and States, administration, and objectives of the cooperative wildlife management research project. Research questions and State work programs for Alabama, Connecticut, Iowa, Maine, Ohio, Oregon, Texas, Utah, and Virginia are discussed.

39. DAVISON, V. 1936. Report on the Arnett, Oklahoma, experimental quail and prairie chicken management project. Abridged by W. L. McAtee. 6 pp.

    Life history findings for lesser prairie-chicken (*Tympanuchus pallidicinctus*) and Northern bobwhite (*Colinus virginianus*) are given. Also included are management studies regarding trapping, feed patches, fire, water requirements, and predators. Misconceptions of hunters, free hunting, and Mexican quail introduction are noted.

40. BASSETT, C. F. 1936. An automatic drinking fountain for minks. 3 pp.

    Describes and illustrates a homemade device for providing clean, fresh drinking water for American minks (*Mustela vison*).

41. MCATEE, W. L. 1936. Fruits attractive to birds—Northwestern States, Region No. 1. 14 pp.

    Discusses fruits attractive to birds in Washington, Oregon, and Idaho. Contains a map of the region, mentions native and extralimital fruit species suitable for the region, and lists important related publications.

42. MCATEE, W. L. 1936. Fruits attractive to birds—Rocky Mountain States, Region No. 2. 12 pp.

    Discusses fruits attractive to birds in Montana, Wyoming, and Colorado.

43. MCATEE, W. L. 1936. Fruits attractive to birds—Northern Plains States, Region No. 3. 13 pp.

    Discusses fruits attractive to birds in North Dakota, South Dakota, Nebraska, and Kansas.

44. MCATEE, W. L. 1936. Fruits attractive to birds—Northeastern States, Region No. 4. 26 pp.

    Discusses fruits attractive to birds in Minnesota, Wisconsin, Michigan, New York, Vermont, New

Hampshire, Maine, Massachusetts, Connecticut, Rhode Island, Iowa, Illinois, Indiana, Ohio, Pennsylvania, New Jersey, West Virginia, Maryland, Delaware, Missouri, Kentucky, and Virginia.

45. McATEE, W. L. 1936. Fruits attractive to birds—California, Region No. 5. 14 pp.

    Discusses fruits attractive to birds in California.

46. McATEE, W. L. 1936. Fruits attractive to birds—Great Basin States, Region No. 6. 9 pp.

    Discusses fruits attractive to birds in Utah and Nevada.

47. McATEE, W. L. 1936. Fruits attractive to birds—Southwestern States, Region No. 7. 10 pp.

    Discusses fruits attractive to birds in Arizona and New Mexico.

48. McATEE, W. L. 1936. Fruits attractive to birds—Southern Plains States, Region No. 8. 12 pp.

    Discusses fruits attractive to birds in Texas and Oklahoma.

49. McATEE, W. L. 1936. Fruits attractive to birds—Southeastern States, Region No. 9. 12 pp.

    Discusses fruits attractive to birds in Arkansas, Tennessee, North Carolina, Louisiana, Mississippi, Alabama, Georgia, and South Carolina.

50. McATEE, W. L. 1936. Fruits attractive to birds—Florida, Region No. 10. 13 pp.

    Discusses fruits attractive to birds in Florida.

51. KALMBACH, E. R. 1938. Local control of magpies. 8 pp.

    Presents the economic status of the black-billed magpie (*Pica pica*) and methods of control, including destruction of nests and young, trapping, and poisoning.

52. DIVISION OF WILDLIFE RESEARCH. 1936. Raising guinea pigs. Prepared in the Section of Fur Resources. 2 pp.

    Provides information on raising guinea pigs (*Cavia porcellus*), including housing, feeding, breeding, and management.

53. DIVISION OF WILDLIFE RESEARCH. 1936. Birdbanding. Prepared in the Section of Distribution and Migration of Birds. 5 pp.

    Presents history, authorization, and future direction of birdbanding. Describes birdbanding regulations and the bird-bands. Discusses traps, risks of bird injury, and the value of birdbanding.

54. YOUNG, S. P. 1936. Rodent control aided by emergency conservation work. 30 pp.

    Discusses need for rodent control and illustrates control work with prairie dogs, ground squirrels, pocket gophers, kangaroo rats, rabbits, hares, and porcupines. Describes Federal, State, and local cooperation, Emergency Conservation Work training, and timeliness of emergency aid. Benefits regarding forest and forage protection and erosion control are given, with examples. Includes methods of safeguarding harmless species.

55. DIVISION OF WILDLIFE RESEARCH. 1936. Pertinent facts on the Angora wool rabbit. Prepared in the Section of Fur Resources. 1 p.

    Presents special considerations relating to domestic rabbit (*Oryctolagus cuniculus*, Angora strain) wool production and marketing.

56. DIVISION OF WILDLIFE RESEARCH. 1936. Periodicals on rabbits and cavies. Prepared in the Section of Fur Resources. 1 p. Revised 1937, 2 pp.

57. ASHBROOK, F. G. 1936. Marking wild animals for identification. 3 pp.

    Ear-tagging, tattooing, and toe-clipping are discussed as marking techniques.

58. KELLOGG, C. E. 1936. Classification and price trends of silver fox skins. 12 pp.

    General and specific price trends in the United States and Great Britain from 1932–1936 are given. Presents distribution of marketed pelts by classes according to degree of silvering.

59. DIVISION OF GAME MANAGEMENT. 1936. Directions for organizing and conducting rabbit drives. Prepared in the Section of Predator and Rodent Control. 2 pp.

    Gives location and construction of corral traps and describes drive organization.

60. BASSETT, C. F. 1936. Feeding the weaned minks. 4 pp.

    Describes experiments in feeding weaned American minks (*Mustela vison*) conducted at the United States Fur Animal Experiment Station, Saratoga Springs, New York. Includes preliminary management of the animals, feeding, results, and conclusions.

61. RUTH, C. 1936. Sullys Hill National Game Preserve, North Dakota. 5 pp.

    Gives location and history of Sullys Hill National Game Preserve, an area rich in historical interest whose primary purpose is education. Other Federal big game ranges and preserves are listed.

62. GUBSER, H. H. 1936. Suggestions on trapping coyotes and wolves in Alaska. 6 pp.

    Identifies need for coyote (*Canis latrans*) control and lists equipment for trapping. Describes preparation of natural and fetid scents and setting of traps, including trail, scent, muskeg, and ice sets. Provides general suggestions for trappers and notes on den hunting.

63. DIVISION OF WILDLIFE RESEARCH. 1936. Raising martens in captivity. Prepared in the Section of Fur Resources. 2 pp.

    Discusses traits of the American pine marten (*Martes americana*), food in the wild and in captivity, and pens and nest boxes. Provides notes on breeding and diseases.

64. NEFF, J. A. 1936. Protecting crops from damage by horned larks in California. 10 pp.

    Describes nature, season, and severity of crop damage by horned larks (*Eremophila alpestris*) on root crops, legumes, lettuce, melons, and tomatoes. Presents control and damage prevention methods, including noise-making devices, shooting or herding-off, attracting vultures, scarecrows, paper confetti, papers on the ground, stakes, and flags. Description and costs of continuous string flagging are given.

65. KELLOGG, C. E. 1936. Relative weights of young rabbits and does during the suckling period. 5 pp.

    Presents average weekly weights of young New Zealand rabbits up to weaning time (8 weeks) and compares weight gain in large and small litters. Provides doe weights during lactation.

66. KELLOGG, C. E. 1936. Polygamous mating of foxes. 4 pp.

    Presents advantages of polygamous mating in foxes and results of polygamous mating trials at the Fur Animal Experiment Station from 1922–36.

67. MCATEE, W. L. 1936. Wildlife technology. 5 pp.

    Gives the origin of wildlife technology and mentions identification, range, migration, food, and cover techniques used in 1936. Emphasizes importance of wildlife technology in all fields of conservation.

68. GRIMES, F. G. 1936. Abstract of fur laws, 1936–37. 32 pp.

    Summarizes state laws regarding possession, sale, and shipment of pelts for 1936–37, by States, Territories and Canadian Provinces.

69. ASHBROOK, F. G. 1936. Fur farming in perspective. 4 pp.

    Follows development of silver fox farming from 1922–34 in the United States and Canada. Gives notes on the industry in other countries and presents recommendations for fox farmers.

70. DIVISION OF WILDLIFE RESEARCH. 1936. Poisonous snakes of the United States. Prepared in the Section of Food Habits. 19 pp.

    Presents key to principal poisonous snakes of the United States and gives names and ranges of rattlesnakes. Describes poison apparatus and venom of venomous snakes. Mortality resulting from snake bite and treatment of bites are discussed. Notes on rattles, young, exposure to sun, and food habits are provided.

71. MCATEE, W. L. 1936. Wildlife in land planning. 6 pp.

    Values of wildlife and wildlife management are presented. Alteration and restoration of the environment and wildlife protection are discussed. Also noted are land use management recommendations and allotment of land for wildlife.

72. HOTCHKISS, N. 1936. Check-list of marsh and aquatic plants of the United States. 27 pp.

    Principal plants occurring in marsh and water areas are listed systematically. Common names are given. Excluded are species characteristic of wood swamps and peat bogs, and algae (except Characeae).

73. BELLAMY, A. E. 1936. Inheritance of "woolly" in rabbits. 4 pp.

    Genetics of woolly in rabbits is explained and suggestions for its elimination are provided.

74. TEMPLETON, G. S. 1936. Nail-keg nest box. 2 pp.

    Instructions for constructing an inexpensive nest box for rabbits are provided. Description, illustrations, and use are included.

75. DIVISION OF WILDLIFE RESEARCH. 1936. Raising otters in captivity. Prepared in the Section of Fur Resources. 2 pp.

    Describes traits of otters and food in the wild and in captivity. Includes notes on breeding, enclosures, and dens.

76. COOKE, M. T. 1936. Some suggestions for bird field study. 6 pp.

    General suggestions for bird field studies regarding equipment, study area and times, field identification, notekeeping, and organization are given.

77. BLAKEY, H. L. 1937. The wild turkey on the Missouri Ozark Range. 32 pp.

    Describes the Missouri Ozark range, types of turkeys present, and conservation efforts in the area. Presents life history of the turkey, including nesting, egg-laying, incubation, eggs, hatching, brooding, and food habits. Discusses the following factors limiting abundance: predators on eggs and other egg losses, predators on birds, diseases, and human activities. Field management techniques such as food patches, restocking, and releasing are included. Future conservation problems are noted.

78. DIVISION OF GAME MANAGEMENT. 1937. Directions for destroying house mice. Prepared in the Section of Predator and Rodent Control. 2 pp.

    Trapping, poisoning, repelling, and using cats as mousers are techniques described for house mice control.

79. McKENNEY, F. D., AND J. E. SHILLINGER. 1937. Vent diseases of domestic rabbits. 4 pp.

Presents symptoms and treatment of spirochetosis and urine burn in domestic rabbits (*Oryctolagus cuniculus*). Includes notes on pyogenic infections.

80. DIVISION OF WILDLIFE RESEARCH. 1937. Feeding and caring for squirrels. Prepared in the Section of Fur Resources. 2 pp.

Describes squirrel food in the wild and in captivity and suitable cages and nests. Provides directions for care and sanitation.

81. KALMBACH, E. R. 1937. Suggestions for combating starling roosts. 17 pp.

Discusses introduction and 1937 range of the starling (*Sturnus vulgaris*), and its positive and negative values. Describes nature and significance of winter roosts, objectionable roosts, and methods of eliminating roosts. Presents crop damage avoidance and prevention techniques, and starling control techniques such as shooting, trapping, capturing, gassing, poisoning, and frightening.

82. DIVISION OF WILDLIFE RESEARCH. 1937. Mink raising. Prepared in the Section of Fur Resources. 8 pp.

Provides history of mink (*Mustela vison*) raising and description of suitable pens, nest boxes, and other equipment. Characterizes good breeding stock and discusses foods, feeding, mating, and care of young. Presents notes on sanitation, management, and animals to be pelted. Pelting operations are described and useful publications are listed.

83. COTTAM, C., AND F. M. UHLER. 1937. Birds in relation to fishes. 16 pp.

Discusses fish-eating birds as a cause of fish depletion. Describes food of pelicans, double-crested cormorant (*Phalacrocorax auritus*), belted kingfisher (*Megaceryle alcyon*), great blue heron (*Ardea herodias*), green-backed heron (*Butorides striatus*), black-crowned night-heron (*Nycticorax nycticorax*), yellow-crowned night-heron (*N. violaceus*), American bittern (*Botaurus lentiginosus*), other herons, gulls and terns, American dipper (*Cinclus mexicanus*), osprey (*Pandion haliaetus*), and mergansers. Presents control methods for fish-eating birds, including screening and wiring ponds, trapping, frightening, and shooting.

84. KELSO, L. H. 1937. Food of the scaled quail. 9 pp.

Includes a description of scaled quail (*Callipepla squamata*) and its range and environment. Discusses food of adults and young and compares these to foods of other quails.

85 TEMPLETON, G. S. 1937. Self-feeding system for market rabbits. 9 pp.

Reports on experiments to devise a feeder allowing rabbits to regulate their own diet. Discusses feeding grains, milled products, and plant protein supplements as food. Provides results for fryer and roaster rabbits. Lists precautions and advantages of feeder and explains construction.

86. McKENNEY, F. D. 1937. Sanitation in domestic rabbitries. 4 pp.

General cleaning procedure and equipment is explained. Choice of a disinfectant and prevention and control of infectious diseases are discussed.

87. JACKSON, H. H. T. 1937. Some accomplishments of the cooperative research units: a summary to January 31, 1937. 10 pp.

Lists nine Cooperative Research Units, their locations, their dates of establishment, and their leaders' names. Activities of each unit are summarized.

88. DIVISION OF WILDLIFE RESEARCH. 1937. The waterfowl situation: 1936–37. Prepared in the Section of Distribution and Migration of Birds. 14 pp.

Reports on the 1936 breeding-ground survey, the 1936 fall migration, and the 1937 January inventory of waterfowl. Describes U.S. breeding grounds. Describes waterfowl areas and species in Mexico, and gives species abundance for Coyuca Lake, Lake Tlahualilo, Don Martin Dam, Tamihua Lagoon, Tigre River, Maydalena Lake, Los Mochis, and Yaqui Valley. Emphasizes need for continued wise waterfowl management.

89. McKENNEY, F. D., AND J. E. SHILLINGER. 1937. Infectious myxomatosis of domestic rabbits (mosquito disease; big-head disease). 2 pp.

Occurrence of myxomatosis (caused by the virus *Myxomatosum*), its common names, transmission, symptoms, and mortality are discussed. Postmortem evidences of the disease, its prevention, and its control are presented.

90. McKENNEY, F. D., AND J. E. SHILLINGER. 1937. Hemorrhagic septicemia of domestic rabbits: contagious nasal catarrh (snuffles), sub-cutaneous abscesses (boils), and other forms. 5 pp.

Presents occurrence and forms of the disease hemorrhagic septicemia, or pasteurellosis, caused by the microorganism. *Pasteurella cuniculicida*, or *Bacterium lepisecticum*. Discusses manifestations, prevention, and control of the disease.

91. GARLOUGH, F. E. 1937. Research studies in the control of destructive mammals. 12 pp.

Describes conditions favoring vertebrate pest increase and suggests control methods for meadow mice, pocket gophers, beaver (*Castor canadensis*), and snowshoe hare (*Lepus americanus*). Study of natural drift movements of covotes (*Canis latrans*) is included. Procedures for developing control

methods and selective poisons and for protecting innocent species are discussed.

92. DIVISION OF WILDLIFE RESEARCH. 1937. The American chameleon and its care. Prepared in the Section of Food Habits. 4 pp.

A description of the Carolina anole (*Anolis carolinensis*) and its range are provided. Activity, food, breeding habits, and recommended care of the chameleon are discussed. Directions for rearing mealworms and cockroaches as a food supply are given.

93. HICKS, L. E. 1937. The controlled-hunting areas and the pheasant refuge-management system in northwestern Ohio. 10 pp.

Describes the Ohio pheasant refuge system and management techniques employed including natural propagation of pheasants, habitat management in cooperation with landowners, winter feeding, and livetrapping and transplanting of surplus stock. The Wood County landowner association controlled-hunting system and general regulations of such associations are discussed.

94. LYNCH, J. J., AND C. COTTAM. 1937. Status of eelgrass (*Zostera marina*) on the North Atlantic Coast, January 1937. 15 pp.

Reviews decline of eelgrass (*Zostera marina*) in 1931 and the subsequent history of the plant. Status of eelgrass on the North Atlantic coast in 1937 is given. Experimental plantings are reported.

95. RUTH, C. 1937. Preserves and ranges maintained for buffalo and other big game. 20 pp.

Presents reasons for establishment, history, and description of Wichita Mountains Wildlife Refuge, National Bison Range, Fort Niobrara Game Preserve, Sullys Hill Game Preserve, Elk Refuge, Charles Sheldon Antelope Range, Charles Sheldon Antelope Refuge, Hart Mountain Antelope Refuge, Desert Game Range, Fort Peck Game Range, and Nunivak Island Wildlife Refuge. Discusses protection of brown bears (*Ursus arctos*) in Alaska, buffalo herds other than those of Biological Survey preserves, and improvement and development of refuges. Includes list of publications on big game animals.

96. KALMBACH, E. R. 1937. Blackbirds and the rice crop on the Gulf coast. 4 pp.

Discusses extent of rice crop damage and area affected by red-winged blackbirds (*Agelaius phoeniceus*) and boat-tailed grackles (*Quiscalus major*). Describes habits, control, and legal status of the birds.

97. GRIMES, F. G. 1937. Abstract of fur laws, 1937–38. 31 pp.

Presents provisions of State laws regarding possession, sale and shipment of pelts for 1937–38. Summarizes by States, Territories, and Canadian Provinces.

98. DIVISION OF WILDLIFE RESEARCH. 1937. Colleges and universities offering courses in wildlife management, 1937–38. Prepared in the Section of Wildlife Surveys. 8 pp.

Discusses ways to prepare for wildlife research or administration positions. Lists universities and other institutions with curricula for undergraduate and graduate training in wildlife management and presents complete list of existing course titles for each.

99. SHILLINGER, J. E. 1937. Disease as a factor in game fluctuation. 3 pp.

Discusses tularemia and paratyphoid in snowshoe hare (*Lepus americanus*), and avian cholera and ulcerative enteritis in grouse as possible factors of population fluctuations. Suggests management techniques for cyclic populations.

100. MCATEE, W. L. 1938. Annotated list and index of Leaflets BS-1 to BS-100. 20 pp.

Describes the nature of the *Wildlife Leaflet* series and provides an abstract of each leaflet and author and subject indexes.

101. TEMPLETON, G. S. 1938. Principles of breeding rabbits. 6 pp.

Describes fundamental factors in mating and suggests breeding ages, a breeding schedule, procedures for making matings, and test matings. Discusses false pregnancy, factors that prevent conception, and remedies, inbreeding, and eliminating woolly fur.

102. TEMPLETON, G. S. 1938. Salt requirements of rabbits. 1 p.

Reports on an experiment on salt requirements of bucks and does with litters, and recommends the self-feeding methods for salt. Results suggest that 1/6 pound salt per 100 pounds of food concentrate is a satisfactory salt ration.

103. DIVISION OF WILDLIFE RESEARCH. 1938. Facts about snakes. Prepared in the Section of Food Habits. 9 pp.

Discusses myths and misconceptions about snakes. Describes general habits, hibernation, skin-shedding, and economic value of snakes. Provides precautionary measures against snakes and suggests methods for snake-proofing buildings and eradicating snakes, including gassing.

104. MCATEE, W. L. 1938. The status of wildlife research: 1937. 30 pp.

Summarizes research projects by Federal and State agencies, universities, museums, and other establishments. Includes Canadian research and costs of wildlife research. Lists number of projects and number of synopsis of subjects.

105. DAY, A. M. 1938. The Federal Aid to Wildlife Restoration Act. 4 pp.

Explains provisions of the Pittman-Robertson Act and appropriations authorized. Discusses functions of the Biological Survey in administering the law, States' maintenance responsibility, permissible projects, and prospective benefits.

106. BODE, I. T. 1938. Report on extension work in wildlife conservation to December 1937. 7 pp.

Describes interest in wildlife conservation, need for an extension program, and need for informational material. Presents work accomplished, plans for 1938, and suggestions for a continuation program.

107. DIVISION OF WILDLIFE RESEARCH. 1938. Planning for wildlife management—an outline. Prepared in the Section of Wildlife Surveys. 5 pp.

Surveys resources, including condition of existing habitat, present wildlife populations, and limiting factors. Describes specific and general management objectives, including 1) better land use for wildlife, 2) proper use of wildlife, 3) protection of personal and property rights, and 4) provision of returns to communities and individuals.

108. SHELDON, H. P. 1938. History and significance of American wildlife. 8 pp.

Describes original wealth in wildlife, exploitation by Indians and white settlers, and influence of wildlife on colonization and settlement. Discusses early traffic in wildlife and its products, decline of exploitation era, and wildlife management. Mentions land-use problems.

109. RUTH, C. 1938. Fort Niobrara Game Preserve, Nebraska. 1938.

Presents location, purpose, and history of the preserve. Provides species lists, improvements, and miscellaneous features, and lists 10 other refuges maintained primarily for big game.

110. COTTAM, C. 1938. Status of eelgrass (*Zostera marina*) on the North Atlantic coast, February 1938. 7 pp.

Reviews previous accounts of eelgrass (*Zostera marina*) wasting disease. Describes 1938 conditions in New England, Canadian Atlantic coast, Long Island, New Jersey and the Delmarva Peninsula, and North Carolina. Discusses experimental plantings of the East and West coast varieties.

111. DIVISION OF WILDLIFE RESEARCH. 1938. The waterfowl situation: 1937-38. Prepared in the Section of Distribution and Migration of Birds. 10 pp.

Results of spring migration observations, breeding ground survey, fall migration observations, and wintering grounds investigations are reported, including studies in Mexico and the Mississippi and Atlantic Flyways, and the January inventory.

112. BASSETT, C. F. 1938. Tankage and livermeal as a summer feed for adult minks. 4 pp.

Reports on substitution of tankage and livermeal for raw meat in an experiment at the U.S. Fur Animal Experiment Station, Saratoga Springs, New York.

113. MILLS, E. M. 1938. European and American methods of rat control. 6 pp.

Compares and describes methods of Norway rat (*Rattus norvegicus*) control in Denmark, England, Germany, Switzerland, France, and America.

114. TEMPLETON, G. S. 1938. Care of rabbits during warm weather. 2 pp.

Discusses adequate freshwater supply, heat protection with water-evaporating devices, hutch ventilation, and cooling container for care of young in warm weather.

115. SPENCER, D. A. 1938. Cultural and other methods for the control of injurious wildlife. 6 pp.

Control methods are discussed for various rodents, bats, deer, porcupines, beavers, blackbirds, herons, and waterfowl. Suggestions include: 1) modification of agricultural practices; 2) defensive methods such as scarecrows, repellents, fences, and transplanting; and 3) poisoning.

116. VAIL, E. L. 1938. Suggestions for control of coccidiosis in rabbits. 1 p.

Describes coccidiosis, its symptoms, transmission, and diagnosis. Prevention recommendations are made.

117. MILLS, E. M. 1938. Protecting orchard trees from deer. 5 pp.

Describes habits of deer and discusses repellent techniques including scaring devices, sprays, "deer proof" fences, asafetida, naphtalene flukes, automatic flash gun, tar paper cones, traps, and electric fences.

118. GRIMES, F. G. 1938. Abstract of fur laws, 1938-39. 35 pp.

Presents 1938-39 provisions of State laws regarding possession, sale, shipment, and export of pelts; open and closed seasons; and licenses, for the United States, Canadian Provinces, and Newfoundland.

119. COTTAM, C. 1938. The coordination of mosquito control with wildlife conservation. 6 pp.

Discusses detrimental effects of mosquito control on wildlife as a result of such techniques as lake ditching and marsh burning. Recommends studies in biological control methods and better coordination between mosquito control and wildlife management. Cites instances of such cooperation.

120. KALMBACH, E. R. 1938. Botulism, a recurring hazard to waterfowl. 8 pp.

Reviews history of knowledge of botulism in waterfowl and summarizes information from 1934–38. Discusses outbreaks since 1932 in the United States, Canada, and Australia. Suggests safeguards for the future.

121. DIVISION OF WILDLIFE RESEARCH. 1938. Two home-made traps for English sparrows. Prepared in the Section of Food Habits. 6 pp.

Summarizes introduction, spread, and economic status of the English (house) sparrow (*Passer domesticus*). Describes control methods, including homemade nest box and funnel traps, and discusses release of other species that may be trapped by these methods.

122. DIVISION OF WILDLIFE RESEARCH. 1939. Big-game inventory of the United States, 1937. Compiled in the Section of Wildlife Surveys. 13 pp.

Discusses sources of information and optimal times for censusing. Species listed include white-tailed deer (*Odocoileus virginianus*), mule deer (*O. hemionus*), black-tailed deer (*O. h. columbianus*), elk (*Cervus elaphus*), caribou (*Rangifer tarandus*), antelope (*Antilocapra americana*), Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*), desert bighorn (*O. c. nelsoni*), mountain goat (*Oreamnos americanus*), javelina (*Pecari angulatus*), European wild boar (*Sus scrofa*), American black bear (*Ursus americanus*), North American grizzly bear (*U. arctos*), and American bison (*Bison bison*). Species are enumerated by State and type of land ownership. Results are summarized.

123. IMLER, R. H., AND E. R. KALMBACH. 1939. Crow damage to fall grain crops in Oklahoma in 1937. 15 pp.

Reports on distribution and abundance of American crows (*Corvus brachyrhynchos*) in Oklahoma and on crow damage to grain. Information is based on studies made at intervals since 1920. Summarizes responses of 1,100 farmers to a questionnaire on crop damage, and compares these with field observations.

124. HORN, E. E. 1939. Factors in nesting losses of the California valley quail. 7 pp.

Describes California quail (*Callipepla californica*) habitat and identifies California ground squirrels (*Spermophilus beecheyi*) as the most serious check on quail breeding. Other factors discussed include hunting pressure, population fluctuation, food supply fluctuation, drought, and natural enemies.

125. ANONYMOUS. 1939. Natural plantings for attracting waterfowl to marsh and other water areas. 5 pp.

Discusses baiting regulation of the Migratory Bird Treaty Act. Recommends plant species for areas with muddy, fluctuating water, and for marshes and marshland ponds.

126. SHELDON, H. P. 1939. History and significance of American wildlife: II. 7 pp.

Discusses rapid exploitation of American natural resources and subsequent recognition of need for conservation. Describes the progress made in wildlife restoration planning, and presents development of wildlife-protection legislation and restoration as a government function.

127. BASSETT, C. F. 1939. An efficient trap for the fox ranch. 2 pp.

Presents description and illustration of fox live trap that does not cause injury.

128. BASSETT, C. F. 1939. A feeder for foxes. 2 pp.

Describes, illustrates, and provides construction plans for the most successful fox feeder tested at U.S. Fur Animal Experiment Station, Saratoga, New York. Provides notes on use and care of feeder.

129. DIVISION OF WILDLIFE RESEARCH. 1938. Cooperative wildlife-management research, 1938. Prepared in the Section of Wildlife Surveys. 4 pp.

Presents locations, leaders, and demonstration areas of cooperative wildlife-management research. Discusses subjects of study and the students concerned in 11 projects.

130. BASSETT, C. F. 1939. Seasonal fox rations and quantities to feed. 3 pp.

Gives special attention to meat content; provides dietary requirements of males, females, and weaned pups.

131. ANONYMOUS. 1939. Suggestions on attracting birds, with reference to available literature. 5 pp.

Gives suggestions for providing protection, nesting facilities, and water and food supplies.

132. HORN, E. E. 1939. Some California wildlife-forest relationships. 5 pp.

Discusses forest-wildlife interactions. Presents observations in California studies of the effects of logging and prescribed burns on deer, cottontails, and mice.

133. ROSENE, W., JR. 1939. A preliminary investigation of the food habits of the mourning dove in Alabama. 10 pp.

Presents analyses of stomach contents of 287 mourning doves (*Zenaida macroura*). Important seed food sources given are grasses—especially cultivated grains—pokeweed, chickweed, legumes, doveweeds, evening primrose, and ragweeds. Field observations of feeding habits are discussed.

134. CHAPMAN, F. B. 1939. A summary of the gray squirrel investigation in southeastern Ohio. 9 pp.

Summarizes life history and ecology of the gray squirrel (*Sciurus carolinensis*) in the unglaciated

counties of southeastern Ohio. Presents data on weights, sex ratios, age-class groups, dens, leaf nests, mating period, litters, parasites, diseases, and population studies. Includes analysis of local hunting, and makes general management recommendations.

135. CROUCH, W. E., AND C. A. LEICHHARDT. 1939. Personnel in Federal game-law enforcement. 8 pp.

Provides job specifications and salaries for U.S. game management agents, deputy U.S. game management agents, and U.S. deputy game wardens. Discusses entrance requirements, duties, and qualifications for physical condition, education, experience, and attitude.

136. DIVISION OF WILDLIFE RESEARCH. 1939. The waterfowl situation: 1938–39. Prepared in the Section of Distribution and Migration of Birds. 18 pp.

Compares observations of spring and fall migrations of 1937 and 1938. Summarizes results of breeding-ground surveys of flyways, and discusses wintering ground surveys and studies in Mexico and the United States. Presents January inventory results and notes on bag limits and total kill.

137. ALDOUS, S. E., AND C. F. SMITH. 1939. Fall and winter food habits of deer in northeastern Minnesota. 10 pp.

Discusses food supply and use, and reports on stomach analyses of 72 northern white-tailed deer (*Odocoileus virginianus*). Results from the range studied indicate a decline in winter carrying capacity; proper management is suggested.

138. ENDERS, R. K. 1939. Sperm studies as a guide in fur-animal breeding practice. 3 pp.

Describes practice of taking sperm smears from the vaginas of mink or foxes to aid in breeding efficiency. Lists equipment and explains process and interpretation of results.

139. TEMPLETON, G. S. 1939. Rabbit-pen construction in relation to sore hocks. 2 pp.

Suggests management techniques (such as use of flooring) for reducing sore hocks in rabbits. Describes treatment of affected animals.

140. DIVISION OF WILDLIFE RESEARCH. 1939. A survey of the annual fur catch of the United States. 19 pp.

Lists total fur catch by species for 1937–38 for 27 States. Includes lists for numerous other States for years between 1933 and 1936.

141. MCCLANAHAN, R. C. 1939. Protecting blueberries from damage by herring gulls. 4 pp.

Describes herring gull (*Larus argentatus*) habits in Washington and Hancock Counties, Maine. Suggests methods of crop protection, such as frightening devices, shooting, and modification of cultural practices.

142. DIVISION OF WILDLIFE RESEARCH. 1939. Big-game inventory of the United States. Compiled in the Section of Wildlife Surveys. 11 pp.

Updates species population trends from *Wildlife Leaflet BS-122.*

143. DIVISION OF WILDLIFE RESEARCH. 1939. Suggestions for the control of vagrant domestic pigeons. Prepared in the Section of Food Habits. 4 pp.

Mentions legal status of the domestic pigeon (*Columba livia*), or rock dove, and presents suggestions for control including frightening devices, trapping, shooting, poisoning, and gassing.

144. DIVISION OF WILDLIFE RESEARCH. 1939. Raising deer in captivity. Prepared in the Section of Wildlife Surveys. 6 pp.

Discusses enclosures and general food requirements of deer. Provides more specific information on characteristics of white-tailed deer (*Odocoileus virginianus*), and mule or black-tailed deer (*O. hemionus*). Mule deer and black-tailed deer are discussed as separate species.

145. LINCOLN, F. C. 1939. Birdbanding. 5 pp.

Presents history, authorization, and direction of bird-banding. Describes the bird bands and birdbanding regulations. Discusses traps, risks of bird injury, and the value of birdbanding.

146. DIVISION OF WILDLIFE REFUGES. 1939. Lake Mattamuskeet Wildlife Refuge. 2 pp.

Describes the 50,000-acre North Carolina refuge and its history. Provides notes on hunting and fishing privileges and on principal waterfowl of the refuge.

147. GRIMES, F. G. 1939. Abstract of fur laws, 1939–40. 37 pp.

Presents 1939–40 provisions of State laws regarding possession, sale, shipment, and export of pelts; open and closed seasons; and licenses, for the United States, Canadian Provinces, and Newfoundland.

148. DIVISION OF WILDLIFE RESEARCH. 1939. Status of the American bison in the United States and Alaska, 1939. Compiled in the Section of Wildlife Surveys, Division of Wildlife Research. 10 pp.

Presents numbers of American bison (*Bison bison*) in the United States and Alaska in 1939, and includes tabulation of location and ownership of herds; number of males, females and calves in each herd; and State, and Nation totals.

149. UHLER, F. M., AND S. CREECH. 1939. Protecting field crops from waterfowl damage by means of reflectors and revolving beacons. 5 pp.

Presents results of experiments on protecting buckwheat in Michigan, rice in Arkansas, and lettuce in Washington from waterfowl damage. Reflectors and revolving beacons are described and their construction is illustrated.

150. COOKE, M. T. 1940. Suggestions for bird field study. 7 pp.

Makes general suggestions for bird field studies regarding equipment, study areas and times, field identification, notekeeping, and organization. Includes list of useful books, periodicals, and pictures.

151. DIVISION OF WILDLIFE RESEARCH. 1940. Raising chinchillas in captivity. Prepared in the Section of Fur Resources, Division of Wildlife Research. 3 pp.

Describes the chinchilla (*Chinchilla laniger*), its habitat, importation, and fur value. Presents suggestions for feeding, breeding, pens, and dens.

152. DIVISION OF WILDLIFE RESEARCH. 1940. Suggested action program for sportsmen's organizations. 5 pp.

Presents opportunities for sportsman cooperation in educational programs; improving wildlife habitat; restocking, winter feeding, and predator programs; Federal and State law enforcement activities; and national and State conservation groups.

153. DIVISION OF WILDLIFE RESEARCH. 1940. The Biological Survey mammal collection. Prepared in the Section of Wildlife Surveys. 4 pp.

Discusses history of the Biological Survey and provides notes of interest on acquisition of the mammal collection.

154. HOTCHKISS, N. 1940. Flora of the Patuxent Research Refuge, Maryland. 34 pp.

Describes the refuge and ecology of the vegetation, and lists by scientific name 706 species of flowering plants and ferns in the area.

155. MAY, F. H. 1940. Raising mealworms. 2 pp.

Describes methods of raising mealworms (*Tenebrio molitor*) for feeding captive birds.

156. KATZ, M. 1940. Ornamental woody plants attractive to birds. 18 pp.

Discusses general considerations for attracting birds and lists important genera of woody plants, their ornamental value, and their use by birds. Scientific and common names of plants are given.

157. DIVISION OF WILDLIFE REFUGES. 1940. Sullys Hill National Game Preserve, North Dakota. 4 pp.

158. MCCLANAHAN, R. C. 1940. Original and present breeding ranges of certain game birds in the United States. 2 pp.

Provides maps of original and present [1940] ranges of 36 game bird species.

159. COTTAM, C., A. L. NELSON, AND L. W. SAYLOR. 1940. The chukar and Hungarian partridges in America. 6 pp.

Discusses the introduction and 1940 status of chukar (*Alectoris chukar*) and Hungarian, or gray, partridge (*Perdix perdix*).

160. MCATEE, W. L. 1940. Wildlife in land planning. 6 pp.

Values of wildlife and wildlife management are presented. Unfavorable alteration of the environment, restoration of the environment, and wildlife protection are discussed. Also noted are the value of and need for wildlife management, land-use management, and allotment of land for wildlife.

161. MCATEE, W. L. 1940. Wildlife technology. 5 pp.

Gives the origin of wildlife technology and mentions identification, range, migration, food, and cover techniques used in 1940. Emphasizes importance of wildlife technology in all areas of conservation.

162. COTTAM, C., AND F. M. UHLER. 1940. Birds as a factor in controlling insect depredations. 6 pp.

Discusses value of birds for controlling insect populations on a local basis.

163. NESTLER, R. B. 1940. Common salt as a curative for cannibalism among game birds in captivity. 2 pp.

Reports on investigations with northern bobwhite (*Colinus virginianus*).

164. KALMBACH, E. R. 1940. Research in the administration of Federal refuges. 7 pp.

Mentions Federal obligations imposed by treaties and legislation for waterfowl protection, and discusses research as a basis for management. Reviews waterfowl predator studies.

165. DIVISION OF WILDLIFE RESEARCH. 1940. The status of migratory game birds: 1939–40. Prepared in the Section of Distribution and Migration of Birds. 22 pp.

Reports on abundance of migratory waterfowl according to spring migration counts, breeding-ground surveys, fall migration counts, wintering-ground surveys, and the January inventory for 1939–40. Discusses starvation of ducks, cripples, and natural enemies. Other migratory game birds discussed are the American woodcock (*Scolopax minor*), mourning dove (*Zenaidura macroura*), American coot (*Fulica americana*), Sora (*Porzana carolina*), common snipe (*Gallinago gallinago*), white-winged dove (*Zenaida asiatica*), and band-tailed pigeon (*Columba fasciata*).

166. MCKENNEY, F. D., AND E. L. VAIL. 1940. Infectious myxomatosis of domestic rabbits. 2 pp.

Reissued with slight revisions from *Wildlife Leaflet* BS-89 (1937).

167. SHILLINGER, J. E. 1940. Grubs in minks. 2 pp.

Describes symptoms of American mink (*Mustela vison*) affected by larvae of the fly (*Wohlfartia vigil*) and recommends treatment of wounds and methods of prevention.

168. LOOSLI, J. K., S. E. SMITH, AND L. A. MAYNARD. 1940. The digestibility of animal products and cereals by minks. 5 pp.

Presents results of experiments with 13 different diets, and analyzes their nutritional content and digestibility coefficients.

169. ENDERS, R. K. 1940. Mink breeding—elementary principles. 4 pp.

Describes female American mink (*Mustela vison*) reproductive system, ovulation, fertilization, and implantation. Provides recommendations for pairing animals and for determining whether impregnation has occurred.

170. DIVISION OF WILDLIFE RESEARCH. 1940. The annual fur catch of the United States. Prepared in the Section of Fur Resources. 21 pp.

171. KNAPPEN, P. 1940. The Java sparrow. 8 pp.

Describes the Java sparrow (*Padda oryzivora*), its distribution, sexual differences, color forms, and hybrids. Discusses importation regulations, feeding, and breeding.

172. KALMBACH, E. R. 1940. Suggestions for combating objectionable roosts of birds with special reference to those of starlings. 18 pp.

Reissued with slight revisions from *Wildlife Leaflet* BS-81 (1937).

173. TEMPLETON, G. S. 1940. Fryer rabbit production. 10 pp.

Suggests suitable domestic rabbit breeds, and proper breeding and feeding procedures.

174. GRIMES, F. G. 1940. Abstract of fur laws, 1940–41. 39 pp.

Presents 1940–41 provisions of State laws regarding possession, sale, shipment, and export of pelts; open and closed seasons; and licenses, for the United States, Canadian Provinces, and Newfoundland.

175. DIVISION OF WILDLIFE RESEARCH. 1940. Big-game inventory of the United States, 1939. Compiled in the Section of Wildlife Surveys. 11 pp.

Updates species population trends from *Wildlife Leaflet* BS-122.

176. PALMER, L. J. 1941. Animal and plant resources of Alaska. 12 pp.

Describes wildlife habitat, flora, and fauna of Alaska. Discusses importance and depletion of wildlife species and the need for proper management. Mentions wildlife research and administration of Alaskan wildlife in 1941.

177. SMITH, S. E., AND C. F. BASSETT. 1941. Horse meat for fur farms: its chemical composition. 7 pp.

Presents and discusses results of an experiment analyzing nutritional components of horse meat. Components measured were total moisture, crude protein, fat, and ash.

178. KELLOGG, C. E. 1941. Inheritance of degree of silvering in foxes. 8 pp.

Describes silvering and the value of silver pelts. Records results of 638 matings for improvement of silvering and provides a possible genetic explanation.

179. DIVISION OF WILDLIFE REFUGES. 1941. National wildlife refuges administered by the Fish and Wildlife Service. 8 pp.

Lists refuges by State and Territory, providing name, location, date of establishment, acreage, and principal protected species of each refuge.

180. DIVISION OF WILDLIFE RESEARCH. 1941. Aids for bird study. 9 pp.

Revises and updates *Wildlife Leaflet* BS-2 (1935).

181. GREEN, D. D., AND E. M. MILLS. 1941. The control of skunks. 4 pp.

Describes habits and signs of striped skunks (*Mephitis mephitis*). Discusses damage by skunks, preventive control and trapping, and State laws protecting skunks.

182. DIVISION OF WILDLIFE RESEARCH. 1941. Some publications of interest to upland game bird breeders. 7 pp.

Lists American and foreign publications regarding propagation and management of gallinaceous game birds and related subjects.

183. DIVISION OF WILDLIFE RESEARCH. 1941. Some publications of interest to waterfowl breeders. Prepared in the Section of Food Habits. 4 pp.

Lists American and foreign publications regarding propagation and management of waterfowl and related subjects.

184. DIVISION OF WILDLIFE RESEARCH. 1941. Publications on rabbits, cavies, and other stock. Compiled in the Section of Fur Resources. 2 pp.

Supersedes *Wildlife Leaflet* BS-56 (1936).

185. COBURN, D. R. 1941. The preparation of blood smears and tissue impressions for laboratory study. 2 pp.

186. DIVISION OF PUBLIC RELATIONS. 1941. Available publications on wildlife. 9 pp.

Revises *Wildlife Leaflet* BS-4 (1937); does not include fisheries publications.

187. DIVISION OF WILDLIFE RESEARCH. 1941. Hints on the care of opossums. Prepared in the Section of Fur Resources. 2 pp.

Describes the opossum (*Didelphis marsupialis*), its distribution, and its habitat. Provides notes on breeding, pens, nest boxes, and feeding.

188. DIVISION OF WILDLIFE RESEARCH. 1941. Raising otters in captivity. Prepared in the Section of Fur Resources. 2 pp.

Describes the river otter (*Lutra canadensis*) and its habits. Provides information on food, breeding, and enclosures. Supersedes *Wildlife Leaflet* BS-75 (1936).

189. DIVISION OF WILDLIFE RESEARCH. 1941. Publications on the selection and care of furs. Prepared in the Section of Fur Resources. 1 p.

190. DIVISION OF PREDATOR AND RODENT CONTROL. 1941. Directions for destroying crawfishes. 2 pp.

Provides directions for fumigating burrows with carbon disulfide and heating them with a coal-tar and creosote cattle dip.

191. DIVISION OF WILDLIFE RESEARCH. 1941. Mink raising. Prepared in the Section of Fur Resources. 10 pp.

Revises and updates *Wildlife Leaflet* BS-82 (previously revised in 1937).

192. KATZ, M. 1941. Selected publications on waterfowl and gallinaceous game birds. 42 pp.

Lists U.S. and foreign publications, including indexes and abstracting publications.

193. DIVISION OF WILDLIFE RESEARCH. 1941. Directions for collecting materials for food habits studies. Prepared in the Section of Food Habits, Division of Wildlife Research. 7 pp.

Revises and updates *Wildlife Leaflet* BS-29 (1935).

194. DIVISION OF PREDATOR AND RODENT CONTROL. 1941. Publications on trapping. 2 pp.

Lists U.S. and foreign publications.

195. DIVISION OF PREDATOR AND RODENT CONTROL. 1931. Directions for poisoning thirteen-striped ground squirrels. 2 pp.

Provides formula for baits and directions for their use in poisoning thirteen-lined (formerly thirteen-striped) ground squirrels (*Spermophilus tridecemlineatus*).

196. DIVISION OF WILDLIFE RESEARCH. 1941. The status of migratory game birds: 1940–41. Prepared in the Section of Distribution and Migration of Birds. 28 pp.

Reports 1940–41 results of spring and fall migration counts, breeding ground surveys, wintering ground surveys in the United States and Mexico, and January inventory for migratory waterfowl. Also provides status of American woodcock (*Scolopax minor*), common snipe (*Gallinago gallinago*), rails, American coot (*Fulica americana*), mourning dove (*Zenaida macroura*), white-winged dove (*Z. asiatica*), and band-tailed pigeon (*Columba fasciata*).

197. DIVISION OF PREDATOR AND RODENT CONTROL. 1941. Directions for controlling tree squirrels. 2 pp.

Reviews legal protection of tree squirrels and describes authorized use of repellents, traps, and guns, when necessary for squirrel control.

198. DIVISION OF WILDLIFE RESEARCH. 1941. Raising muskrats. Prepared in the Section of Fur Resources. 2 pp.

Reissued with slight revisions from *Wildlife Leaflet* BS-35 (1937).

199. DIVISION OF WILDLIFE RESEARCH. 1941. Abstract of fur laws, 1941–42. Compiled in the Section of Fur Resources. 40 pp.

Presents 1941–42 provisions of State laws regarding possession, sale, shipment, and export of pelts; open and closed seasons; and licenses for the United States, Canadian Provinces, and Newfoundland.

200. MCATEE, W. L. 1941. Annotated list and index of *Wildlife Leaflets* 101–200. 20 pp.

Provides an abstract of each leaflet, a description of the series, and subject and author indexes.

201. DIVISION OF WILDLIFE RESEARCH. 1941. Publications on attracting birds. 6 pp.

Revises and updates *Wildlife Leaflet* BS-8 (1935).

202. TEMPLETON, G. S. 1941. Angora rabbit wool production. 10 pp.

Presents special considerations relating to the domestic (Angora) rabbit (*Oryctolagus cuniculus*) wool production and marketing.

203. DIVISION OF WILDLIFE RESEARCH. 1941. Raising badgers in captivity. 2 pp.

Revises and updates *Wildlife Leaflet* BS-32 (1936).

204. MOFFITT, J., AND C. COTTAM. 1941. Eelgrass depletion on the Pacific coast and its effect upon black brant. 26 pp.

Describes distribution of eelgrass (*Zostera marina*) and discusses its destruction on the Atlantic coast and resulting effects on waterfowl. Provides status of plant on Pacific coast of Alaska, British Columbia, Washington, Oregon, California, Baja California, and Mexico. Relates eelgrass fluctuations to brant (*Branta bernicla*) numbers and habits.

205. MAY, F. H. 1941. Raising mealworms. 2 pp.

Reissued with slight revisions from *Wildlife Leaflet* BS-155 (1940).

206. BASSETT, C. F. 1941. Seasonal fox rations and quantities to feed. 3 pp.

Reissued with slight revisions from *Wildlife Leaflet* BS-130 (1939).

207. DIVISION OF WILDLIFE RESEARCH. 1942. Big-game inventory of the United States, 1940. 10 pp.

Revises *Wildlife Leaflet* BS-122.

208. DIVISION OF WILDLIFE RESEARCH. 1942. Publications on fur and fur animals. 5 pp.

Revises *Wildlife Leaflet* BS-36 (1936).

209. KELLOGG, C. E. 1942. Market classification and grading of muskrat pelts taken from Blackwater Refuge in 1941. 5 pp.

Classifies pelts according to color, sex, and age of animal, size of pelt, and season when taken.

210. HOTCHKISS, N. 1942. Check-list of marsh and aquatic plants of the United States. 35 pp.

Lists plants by scientific and common name. Excludes algae (except Characeae) and species characteristic of wooded swamps and peat bogs.

211. DIVISION OF WILDLIFE RESEARCH. 1942. The Biological Surveys mammal collection. 5 pp.

Revises and updates *Wildlife Leaflet* BS-153 (1940).

212. DIVISION OF WILDLIFE RESEARCH. 1942. Care of buffaloes. 8 pp.

Provides notes on enclosures, handling methods, and the hybrid cattaloes. Discusses forage and mineral requirements, growth, development, diseases, and parasites of the American bison (*Bison bison*).

213. VAIL, E. L. 1942. Infectious myxomatosis of domestic rabbits. 3 pp.

Revised from *Wildlife Leaflet* BS-166 (1940).

214. DIVISION OF WILDLIFE RESEARCH. 1942. Care of white mice and rats. 2 pp.

Discusses feeding, breeding, and cages of white mice and rats.

215. ENDERS, R. K. 1942. Sperm studies as a guide in fur-animal breeding practice. 3 pp.

Reissued with slight revisions from *Wildlife Leaflet* BS-138 (1939).

216. FLETCHER, C. C. 1942. Rabbit manure as a fertilizer. 4 pp.

Discusses value of rabbit manure as a fertilizer and compares it to other animal manures.

217. CROUCH, W. E. 1942. War and wildlife. 4 pp.

Summarizes effects of World War I on conservation and suggests application of this knowledge to existing conditions in World War II.

218. TEMPLETON, G. S. 1942. Domestic rabbits in the food for freedom program. 8 pp.

Discusses raising rabbits for home consumption. Includes information on choosing a breed, selecting breeding stock, hutches and equipment, rabbit care, feeding, slaughtering, skinning, pelt care, and commercial production.

219. DIVISION OF WILDLIFE RESEARCH. 1942. Raising guinea pigs. 2 pp.

Revises and updates *Wildlife Leaflet* BS-52 (1936).

220. KALMBACH, E. R. 1942. Blackbirds and grain crops in the eastern United States. 5 pp.

Presents legal status of red-winged blackbirds (*Agelaius phoeniceus*), boat-tailed grackles (*Quiscalus major*), common grackles (*Q. quiscula*), and yellow-headed blackbirds (*Xanthocephalus xanthocephalus*). Discusses control methods including shooting, frightening, and poisoning. Also mentions avoiding damage through changes in agricultural practices.

221. LINCOLN, F. C. 1942. Treatment of oil-soaked birds. 2 pp.

Discusses cleaning and treatment of oil-soaked birds, and refers to the Oil Pollution Act of 1924.

222. DIVISION OF WILDLIFE RESEARCH. 1942. Laboratory procedure in wildlife food studies. 11 pp.

Presents methods of analysis of stomachs, crops, droppings, pellets, intestinal material, cheek-pouch material, and nest and den debris for wildlife food studies. Discusses recording data and storage of examined material.

223. DIVISION OF WILDLIFE RESEARCH. 1942. Natural plantings for attracting waterfowl to marsh and other water areas. 4 pp.

Revises and updates *Wildlife Leaflet* BS-125 (1939).

224. COTTAM, C., AND F. M. UHLER. 1942. Birds as a factor in controlling insect depredations. 6 pp.

Reissued with slight revisions from *Wildlife Leaflet* BS-162 (1940).

225. DIVISION OF WILDLIFE RESEARCH. 1942. The status of migratory game birds: 1941–42. 9 pp.

Reports 1941–42 results of spring and fall migration counts, breeding-ground surveys, wintering-ground survey, and January inventory for migratory waterfowl. Provides status of American woodcock (*Scolopax minor*), common snipe (*Gallinago*), rails, American coot (*Fulica americana*), mourning dove (*Zenaida macroura*), white-winged dove (*Z. asiatica*), and band-tailed pigeon (*Columba fasciata*).

226. DIVISION OF WILDLIFE RESEARCH. 1942. Abstract of fur laws, 1942–43. 43 pp.

Revises *Wildlife Leaflet* BS-118 (1938). Mentions the Lacey Act and the effect of World War II on fur trapping.

227. SATER, E. N. 1942. Wildlife contributions to the Nation's war program. 13 pp.

Discusses mostly fisheries programs but also includes programs in 1) damage control by predators and rodents, 2) cooperation in production and use

of furs, 3) regulation of game harvest, and 4) protection of wildlife in Alaska and on refuges.

228. COOKE, M. T. 1942. Suggestions for bird field-study. 7 pp.

Reissued with slight revisions from *Wildlife Leaflet* BS-150 (1940).

229. DOZIER, H. L. 1942. Recipes for cooking muskrat meat. 5 pp.

230. MCKENNEY, F. D. 1943. Sanitation in domestic rabbitries. 4 pp.

Reissued from *Wildlife Leaflet* BS-86 (1937).

231. MCKENNEY, F. D., AND J. E. SHILLINGER. 1943. Vent diseases of domestic rabbits. 4 pp.

Reissued from *Wildlife Leaflet* BS-79 (1937).

232. DIVISION OF WILDLIFE RESEARCH. 1943. Annual fur catch of the United States. 22 pp.

Lists fur catch by species for 39 States and Alaska for each of various years from 1934–41.

233. DIVISION OF WILDLIFE RESEARCH. 1943. Poisonous snakes of the United States. 17 pp.

Revises and updates *Wildlife Leaflet* BS-70 (1936).

234. DIVISION OF PREDATOR AND RODENT CONTROL. 1943. Directions for destroying house mice. 3 pp.

Reissued with slight revisions from *Wildlife Leaflet* BS-78 (1937).

235. LINCOLN, F. C. 1943. Birdbanding. 5 pp.

Revises and updates *Wildlife Leaflet* BS-145 (1939).

236. DIVISION OF PREDATOR AND RODENT CONTROL. 1943. Protecting victory gardens from animal pests. 6 pp.

Suggests control methods for cottontails, moles, pocket gophers, field mice, ground squirrels, woodchucks, rats, and birds.

237. DIVISION OF PREDATOR AND RODENT CONTROL. 1943. Control of woodchucks. 4 pp.

Suggests gassing as most applicable for gray marmots (*Marmota monax*) and poisoning as most applicable for hoary marmots (*Marmota caligata*) and yellow-bellied marmots (*Marmota flaviventris*).

238. JEWETT, S. G. 1943. Klamath Basin National Wildlife Refuges, Oregon and California. 18 pp.

Discusses the history of the region and the four refuges: Upper Klamath, Lower Klamath, Tule Lake, and Clear Lake. Discusses life zones and noteworthy features, and lists birds and mammals. Provides information about other refuges.

239. DIVISION OF WILDLIFE RESEARCH. 1943. Enteritis, or so-called bloat, in domestic rabbits. 1 p.

Discusses enteritis (bloat) its symptoms in domestic rabbits, and its characteristics in post-mortem examination.

240. DIVISION OF PUBLIC RELATIONS. 1943. Recipes for cooking domestic rabbit meat. 17 pp.

241. VAIL, E. L. 1943. Control of coccidiosis in rabbits. 1 p.

Reissued from *Wildlife Leaflet* BS-116 (1938).

242. TEMPLETON, G. S. 1943. Rabbit-pen construction in relation to sore hocks. 2 pp.

Reissued with minor revisions from *Wildlife Leaflet* BS-139 (1939).

243. DIVISION OF WILDLIFE RESEARCH. 1944. Raising martens in captivity. 3 pp.

Revises and updates *Wildlife Leaflet* BS-63 (1936).

244. BELLAMY, A. W. 1943. Inheritance of "woolly" in rabbits. 4 pp.

Reissued from *Wildlife Leaflet* BS-73 (1936).

245. VAIL, E. L., AND F. D. MCKENNEY. 1943. Diarrhea in domestic rabbits. 1 p.

Discusses cause, symptoms, prevention, and control of diarrhea in domestic rabbits.

246. RASMUSSEN, D. I., AND M. D. WILDE. 1943. Save game meat—it is valuable. 5 pp.

Discusses treatment of game carcasses in the field and in storage, and describes curing of wild meat. Tabulates amount of usable flesh obtainable from deer of various weights.

247. KELLOGG, C. E. 1943. Feed costs of producing young rabbits to weaning age. 3 pp.

Revises and updates *Wildlife Leaflet* BS-21 (1935).

248. TEMPLETON, G. S. 1944. Malocclusion, or "buck teeth" in rabbits. 4 pp.

Presents and discusses results of experiments on malocclusion, its causes, and its treatment. Suggests methods for eradicating the disease from rabbit herds.

249. ASHBROOK, F. G. 1943. Abstract of fur laws, 1943–44. 43 pp.

Revises *Wildlife Leaflet* 226 (1942).

250. DIVISION OF WILDLIFE RESEARCH. 1943. The status of migratory game birds: 1942–43. 11 pp.

Revises *Wildlife Leaflet* 225 (1942).

251. DIVISION OF WILDLIFE RESEARCH. 1944. Raising raccoons. 2 pp.

Reissued with minor revisions from *Wildlife Leaflet* BS-34 (1936).

252. KALMBACH, E. R. 1944. Local control of magpies through destroying nests and roosts and through trapping. 4 pp.

Reissued with minor revisions from *Wildlife Leaflet* BS-51 (1938).

253. DIVISION OF WILDLIFE RESEARCH. 1944. Annual fur catch of the United States. 21 pp.

Reports on harvest of fur species in the early 1940's in Alaska, the Pribilof Islands, and the United States.

254. DIVISION OF WILDLIFE RESEARCH. 1944. Control of vagrant domestic pigeons. 4 pp.

Discusses origin and status of feral pigeons, or rock doves, (*Columba livia*) and suggests control methods including eliminating roosting and nesting perches, frightening, trapping, shooting, poisoning, and gassing.

255. TEMPLETON, G. S. 1944. Value and use of rabbit manure. 4 pp.

Discusses composition of rabbit manure, its value as a fertilizer, quantity produced, and storage methods.

256. IMLER, R. H. 1944. Electric beacons used to frighten wild ducks from grainfields. 5 pp.

Describes and illustrates a beacon and reports on tests of it in North Dakota and Colorado.

257. DIVISION OF WILDLIFE RESEARCH. 1944. Facts about snakes. 10 pp.

Reissued with slight revisions from *Wildlife Leaflet* BS-103 (1938).

258. DIVISION OF WILDLIFE RESEARCH. 1944. List of fox and fur breeders associations. 5 pp.

259. DIVISION OF WILDLIFE RESEARCH. 1944. Care of parrots. 16 pp.

Discusses species selection, housing, general care, feeding, grit, and breeding. Suggests methods for teaching parrots. Includes information on parrot maladies and psittacosis (parrot fever). Reviews importation, inspection, and quarantine, and provides a list of publications about parrots.

260. SILVER, J. 1944. Eliminating bats from buildings. 4 pp.

Describes bats, their habits, and their economic status. Recommends control methods, including bat-proofing buildings, using repellents, and fumigating.

261. DIVISION OF WILDLIFE RESEARCH. 1944. Status of migratory game birds: 1943–44. 10 pp.

Revises *Wildlife Leaflet* BS-165 (1940).

262. ASHBROOK, F. G. 1944. Abstract of fur laws, 1944–45. 43 pp.

Revises *Wildlife Leaflet* BS-118 (1938).

263. ANONYMOUS. 1944. Manufacturers of traps. 1 p.

264. SPENCER, H. J. 1944. Emetic agent in toxic rat bait, a safeguard for dogs and cats. 5 pp.

Reviews earlier studies with copper sulfate and zinc phosphide used in control of field mice. Presents and discusses results of tests of antimony oxide, copper sulphate, zinc sulfate, and tartar emetic (antimony potassium tartrate) on dogs, cats, and Alexandrine rats (*Rattus rattus alexandrinus*).

265. NESTLER, R. B. 1945. Some publications on upland game birds. 11 pp.

Includes publication on pheasants, quails, grouse, partridges, wild turkeys (*Meleagris gallopavo*), and guinea fowl.

266. TEMPLETON, G. S. 1945. Selection and preparation of rabbit rations. 6 pp.

Discusses suitable feeds and feed requirements. Explains feed purchasing, preparation and storage, and preparation of rations.

267. NESTLER, R. B. 1945. Some recent publications on management and propagation of waterfowl. 5 pp.

Reissued and updated from *Wildlife Leaflet* 183 (1941).

268. NEFF, J. A. 1945. Protecting home gardens and small fruits from attack by birds. 14 pp.

Lists birds commonly involved and their legal status. Control methods described include covering plants, removing resting places, destroying nests, eliminating accessible poultry feeds, shooting, trapping, using chemical repellents, frightening and poisoning. Provides notes on injurious animals.

269. DIVISION OF PREDATOR AND RODENT CONTROL. 1945. How to control vagrant cats. 3 pp.

Mentions habits and status of vagrant cats. Describes homemade cat trap and provides notes on commercial traps and trapping methods.

270. DIVISION OF WILDLIFE RESEARCH. 1945. Winter nest boxes for rabbits. 2 pp.

Describes nest boxes and suggests ways to care for the litter.

271. DIVISION OF WILDLIFE RESEARCH. 1945. Tularemia, an animal-borne disease. 4 pp.

Reissued with minor revisions from *Wildlife Leaflet* BS-5 (1935).

272. COTTAM, C., AND F. M. UHLER. 1945. Birds in relation to fishes. 16 pp.

Reissued with minor revisions from *Wildlife Leaflet* BS-83 (1937).

273. DIVISION OF WILDLIFE REFUGES. 1945. Malheur National Wildlife Refuge, Oregon. 8 pp.

Provides general discussion of topography, history, birds, mammals, and interesting features of the

refuge. Mentions the refuge birdbanding program, and provides tourist information and an economic use statement.

274. DIVISION OF WILDLIFE RESEARCH. 1945. Status of migratory game birds: 1944–45. 10 pp.

Revised from *Wildlife Leaflet* BS-165 (1940).

275. HORN, E. E. 1945. Some California wildlife-forest relationships. 5 pp.

Reissued with minor revisions from *Wildlife Leaflet* BS-132 (1939).

276. DIVISION OF WILDLIFE RESEARCH. 1945. Annual fur catch of the United States. 22 pp.

Revised and updated from *Wildlife Leaflet* 232 (1943).

277. DIVISION OF WILDLIFE RESEARCH. 1945. Sources of big-game animals. 2 pp.

Lists Federal government and commercial agencies that occasionally supply surplus game.

278. ANONYMOUS. 1947. Duck-food plants available from dealers. 7 pp.

Listed by common and scientific name.

279. ASHBROOK, F. G. 1945. Abstract of fur laws, 1945–46. 48 pp.

Revised from *Wildlife Leaflet* BS-118 (1938).

280. DIVISION OF WILDLIFE RESEARCH. 1945. Dealers in amphibians and reptiles. 3 pp.

281. DIVISION OF WILDLIFE RESEARCH. 1945. Dealers in upland game birds. 35 pp.

282. DIVISION OF INFORMATION. 1946. History and significance of American wildlife. 16 pp.

Combines and revises *Wildlife Leaflets* BS-108 (1938) and BS-126 (1939).

283. DIVISION OF WILDLIFE RESEARCH. 1946. Big-game inventory of the United States, 1943. 11 pp.

Revises *Wildlife Leaflet* BS-122 (1939).

284. KELLOGG, C. E. 1946. Polygamous mating of foxes. 4 pp.

Revises and updates *Wildlife Leaflet* BS-66 (1936).

285. KNAPPEN, P. 1946. Publications on cage birds. 13 pp.

Revises and updates *Wildlife Leaflet* BS-6 (1935).

286. DIVISION OF WILDLIFE RESEARCH. 1946. Suggestions for care and rearing of ferrets. 2 pp.

Discusses food, pens, reproduction, and health of ferrets.

287. DIVISION OF WILDLIFE RESEARCH. 1946. Facts about 1080. 2 pp.

Discusses the chemical 1080 (sodium fluoroacetate), its characteristics, and its toxicity for various animals. Provides directions for its use in rat control, and suggests treatment for accidental ingestion by humans.

288. DIVISION OF WILDLIFE RESEARCH. 1946. Facts about ANTU. 2 pp.

Describes alphanaphthylthiourea, its characteristics, and its toxicity to rats and other animals. Provides directions for its use in rat control.

289. DIVISION OF WILDLIFE RESEARCH. 1946. Raising deer in captivity. 9 pp.

Reissued with minor revisions from *Wildlife Leaflet* BS-144 (1939).

290. DIVISION OF WILDLIFE RESEARCH. 1946. Annual fur catch of the United States. 22 pp.

Revised from *Wildlife Leaflet* BS-118 (1938).

291. ASHBROOK, F. G. 1946. Abstract of fur laws, 1946–47. 49 pp.

Revised from *Wildlife Leaflet* BS-118 (1938).

292. ALDRICH, J. W. 1947. The Hungarian and chukar partridges in America. 10 pp.

Discusses introductions, habitat requirements, and history and success of stocking ventures of the gray (formerly Hungarian) partridge (*Perdix perdix*) and the chukar (*Alectoris chukar*).

293. CHARTERS, E. M. 1947. Bibliography on walrus. 14 pp.

294. LINCOLN, F. C. 1947. Keeping up with the waterfowl. 10 pp.

Describes methods of waterfowl population estimation. Briefly discusses flyways, banding returns, refuge system, and waterfowl crop damage. Provides maps of principal waterfowl breeding and wintering ranges, and the flyways with their refuge systems.

295. ROBINETTE, W. L. 1947. Deer mortality from gunshot wounds. 8 pp.

Describes a study of losses in mule deer (*Odocoileus hemionus*) from crippling in Fishlake National Forest, Utah, and discusses results.

296. SWANSON, G., AND L. E. YEAGER. 1947. Colleges and universities offering courses in wildlife management, 1946–47. 15 pp.

Revises and updates *Wildlife Leaflet* BS-98 (1937). Includes preparation for wildlife work in research, administration, management, teaching, extension, outdoor writing, photography, and art. Mentions employment opportunities.

297. ASHBROOK, F. G. 1947. Abstract of fur laws, 1947–48. 46 pp.

Revises *Wildlife Leaflet* BS-118 (1938).

298. ASHBROOK, F. G. 1947. Annual fur catch of the United States. 24 pp.

Revises *Wildlife Leaflet* BS-140 (1939).

299. SALYER, J. C. II. 1948. Directory of national wildlife refuges. 6 pp.

Lists refuges according to regions and provides names and addresses of regional directors and refuge managers.

300. DIVISION OF INFORMATION. 1949. Annotated list and index of *Wildlife Leaflets* 201–300. 27 pp.

Revises *Wildlife Leaflet* BS-100 (1938).

301. JONES, J. C., AND E. M. MILLS. 1948. Dealers in rodenticides. 3 pp.

302. DIVISION OF WILDLIFE RESEARCH. 1948. Feeding and caring for squirrels. 2 pp.

Describes food, cages, and nests for raising squirrels, and suggests sanitation measures.

303. DIVISION OF WILDLIFE RESEARCH. 1948. Big-game inventory of the United States, 1946. 13 pp.

Reissued from *Wildlife Leaflet* BS-122 (1939).

304. TAYLOR, W. P. 1948. Outlines for the study of mammalian ecology and life histories. 26 pp.

Discusses the mammalian community and wildlife management and describes study methods and equipment. Presents background data including work preparation, environment, heredity, animal-plant relations, mammalian life histories, and lower mammal-man relations. Suggests such subjects for study as 1) environmental influences on mammals, 2) mammalian influences on environment, 3) life histories, 4) structure and behavior, and 5) lower mammals and man.

305. AUSTIN, O. L., COMPILER. 1948. Japanese ornithology and mammalogy during World War II: an annotated bibliography. 1948. 45 pp.

Provides an annotated bibliography of publications about birds and mammals in Japan from 1941–1947. Includes a section on periodicals.

306. DOZIER, H. L. 1948. Estimating muskrat populations by house counts. 17 pp.

Discusses house count as a population index for muskrat (*Ondatra zibethica*) and describes different structures including nesting houses, feeding huts, push-up (or breathers), bank leads, den burrows, and temporary and semi-permanent retreats. Muskrat census methods mentioned are transects, roadside counts, ground strip counts, and aerial censuses. Presents normal range and movements, and numbers of animals per house. Relates population estimation to regulatory trapping laws.

307. BRANCH OF WILDLIFE RESEARCH. 1948. Two home-made traps for English sparrows. 9 pp.

Discusses United States history of house sparrows (*Passer domesticus*) and their economic status. Describes damage prevention and control methods, including use of nest boxes and funnel traps.

308. NEFF, J. A. 1948. Protecting crops from damage by horned larks in California. 11 pp.

Reissued from *Wildlife Leaflet* BS-64 (1936).

309. ALLEN, D. L. 1948. Wildlife management in land-use programs. 6 pp.

Discusses soil, soil conservation, and wildlife. Includes notes on land productivity and wildlife values. Describes government programs, national planning, and a need for public awareness.

310. ALDOUS, S. E., AND C. F. SMITH. 1948. Fall and winter food habits of deer in northeastern Minnesota. 10 pp.

Reissued with minor revisions from *Wildlife Leaflet* BS-137 (1939).

311. MCATEE, W. L. 1948. Wildlife technology. 6 pp.

Reissued with slight revisions from *Wildlife Leaflet* BS-161 (1940).

312. HOSLEY, N. W. 1949. The moose and its ecology. 51 pp.

Discusses distribution, economics, and life history of moose (*Alces alces*). Describes characteristics affecting management including social habits, movements, foods and feeding, cover, and senses of moose. Other influential characteristics are populations, moose-beaver relations, decimating factors, carrying capacity, and productivity. Techniques of management include census methods, range improvement, stocking, sanctuaries, protection, and regulated hunting.

313. HOMMEL, M. L. 1948. Organizations and officials concerned with wildlife protection: 1948. 33 pp.

Lists governmental and nongovernmental organizations in the United States, Canada, Newfoundland, Mexico, West Indies, Central America, South America, and the Philippines.

314. ASHBROOK, F. G. 1948. Fur an important wildlife crop. 6 pp.

Describes the fur trade as a big business and suggests how to produce more and better furs. Mentions breeding stock produced on farms and refuges.

315. ASHBROOK, F. G. 1948. Annual fur catch of the United States [1948]. 24 pp.; 1950. Annual Fur Catch of the United States [1949]. 23 pp.; 1951. Annual Fur Catch of the United States [1950]. 25 pp.; 1952. Annual Fur Catch of the United States [1951]. 24 pp.

Reissued from *Wildlife Leaflet* BS-140 (1939).

316. ASHBROOK, F. G. 1948. Abstract of fur laws, 1948–49. 42 pp.

Reissued from *Wildlife Leaflet* BS-118 (1938).

317. JACKSON, H. H. T., E. M. CHARTERS, A. J. DUVALL, AND S. F. HILDEBRAND. 1949. Literature on the natural history of the Arctic region; with special reference to Alaska and Canada. 48 pp.

318. SPENCER, D. A. 1949. Management methods and safeguards employed in reductional control of injurious wildlife. 9 pp.

Reissued from *Wildlife Leaflet* BS-115 (1938). Additions include a more thorough discussion of poisons, their use, and safeguards.

319. ASHBROOK, F. G. 1949. Nutrias grow in the United States. 14 pp.

Describes nutrias (*Myocastor coypus*) and discusses captivity, import, release, and escape. Explains feeding habits, breeding, and reproduction. Mentions trapping, pelt preparation, and nutria meat as food.

320. ALDOUS, S. E. 1949. Experimental planting of food and cover for deer. 9 pp.

Reports on experimental food and cover plantings of balsam fir (*Abies balsamea*) and black spruce (*Picea mariana*). Includes plantings in deer yards and newly cleared forests and discusses planting versus natural regeneration.

321. BRANCH OF WILDLIFE RESEARCH. 1949. Big-game inventory of the United States, 1947. 3 pp.; 1950. Big-game inventory of the United States, 1948. 3 pp.; 1951. Inventory of big-game animals of the United States, 1949. 3 pp.

Reissued from *Wildlife Leaflet* BS-122 (1939).

322. BRANCHES OF WILDLIFE RESEARCH AND PREDATOR AND RODENT CONTROL. 1949. Publications on fur animals and trapping. 4 pp.

Includes American, Canadian, and European periodicals, U.S. Department of the Interior publications, and other publications.

323. DAY, A. M. 1949. Old man of the Pribilofs. 13 pp.

Discusses northern fur seals (*Callorhinus ursinus*) in the Pribilof Islands, Alaska, and their life history. Presents history of fur sealing, regulations, the Pribilof Islands, and fur seal populations. Describes hunting and processing of seals. Mentions recent [1949] fur seal investigations.

324. MARTIN, A. C. 1950. Literature references on waterfowl. 10 pp.

325. MARTIN, A. C. 1949. Procedures in wildlife food studies. 10 pp.

Explains removing, preserving, labeling, and recording of stomachs and other food study materials. Describes examination procedures such as preparation, segregation, identification, and computation.

326. ASHBROOK, F. G. 1949. Abstract of fur laws, 1949–50. 42 pp.; 1950. Abstract of fur laws, 1950–51. 45 pp.; 1951. Abstract of fur laws, 1951–52. 43 pp.

Reissued from *Wildlife Leaflet* BS-118 (1938).

327. LINCOLN, F. C. 1950. Birds protected by Federal law. 13 pp.

Discusses the Migratory Bird Treaty Act of 1918 and its amendment in 1936. Mentions the establishment of the Alaska Game Commission in 1925 and the approval of the Protection of the Bald Eagle Act in 1940. Provides a current [1950] list of species under protection of the Migratory Bird Treaty Act, including species protected only in Alaska.

328. SPENCER, D. A. 1950. The porcupine, its economic status and control. 7 pp.

Describes North American (Canadian) porcupines (*Erethizon dorsatum*) and yellow-haired porcupine (*Erethizon epixanthum*) and discusses their habits, breeding, and feeding. Discusses the economic status of the porcupine, and suggests hunting, trapping, fencing, and poisoning as control methods.

329. SCHEFFER, V. B. 1950. The food of the Alaska fur seal. 16 pp.

Describes feeding habits in the wild and in captivity, and stomach contents of the Northern fur seal (*Callorhinus ursinus*) in Alaska.

330. KRINOWITZ, A. 1950. Organizations and officials concerned with wildlife protection, 1950. 35 pp.

Supersedes *Wildlife Leaflet* 313 (1948). Replaced in 1951 by the Animal Conservation Directory, published by the National Wildlife Federation.

331. HERMAN, C. M. 1950. Trichomoniasis, disease of mourning doves. 2 pp.

Describes the parasite *Trichomonas gallinae* and its effects on mourning doves (*Zenaida macroura*). Discusses transmission of the disease.

332. DALE, F. H. 1951. Ringneck [*sic*] pheasant management. 3 pp.

Discusses land management for ring-necked pheasants (*Phasianus colchicus*) and suggests measures for pheasant propagation.

333. SILVER, J., AND J. C. JONES. 1951. Control of bats. 4 pp.

Presents facts about bats and damage they cause. Suggests control methods such as repellents, bat-proof buildings, and fumigation.

334. DuMont, P. A. 1951. National Wildlife Refuge bibliography. 53 pp.

Publications are listed in two sections: 1) Refuge history, establishment, location, and legislation; and 2) habitat improvement, management, migration, and research.

335. Dale, F. H. 1951. Bobwhite propagation and management. 4 pp.

Presents some problems in northern bobwhite (*Colinus virginianus*) management and propagation. Provides sources for detailed information.

336. [Not issued]

337. Branch of Predator and Rodent Control. 1952. Characteristics of common rodenticides. 4 pp.

Classifies common rodenticides according to toxicity, dosage levels, relative effectiveness, degree of acceptance, development of tolerances, odor, taste, solubility, and safety precautions. Compounds discussed are ANTU (alphanapthylthiourea), arsenic trioxide, arsenous oxide (micronized), barium carbonate, yellow phosphorus, red squill (fortified), sodium fluoroacetate (compound 1080), strychnine (alkaloid), strychnine sulfate, thallium sulfate, warfarin, and zinc phosphide.

338. Wilke, F. 1952. Pelagic fur seal research off Japan in 1950. 35 pp.

Presents and discusses results of fur seal population studies in Japan from 1948 to 1950.

339. Stickel, W. H. 1952. Venomous snakes of the United States and treatment of their bites. 29 pp.

Describes distribution, recognition, and natural history of venomous snakes in the United States. Discusses protection and treatment of snake bites for humans and livestock.

340. Branch of Predator and Rodent Control. 1952. Pocket gopher control. 6 pp.

Describes pocket gophers and their habits. Describes toxic baits and trapping as control methods, and provides bait formulas.

341. Branch of Wildlife Refuges. 1952. Availability of surplus big-game animals on National Wildlife Refuges. 6 pp.

Supersedes *Wildlife Leaflet* 277 (1945).

342. Branch of Wildlife Research. 1952. Inventory of big-game animals of the United States, 1950. 5 pp.

Reissued from *Wildlife Leaflet* BS-122 (1939). Includes the wild turkey (*Meleagris gallopavo*) in inventory.

343. Ashbrook, F. G. 1952. Abstract of fur laws, 1952–53. 43 pp.

Reissued from *Wildlife Leaflet* BS-118 (1938).

344. Kenyon, K. W., and V. B. Scheffer. 1953. The sea otter, sea lions, and seals of the West Coast. 28 pp.

Provides descriptions, sketches, and photographs for identification of six species of seal-like mammals of the Pacific Coast.

345. Stickel, W. H. 1953. Control of snakes. 8 pp.

Mentions recognition of dangerous snakes and discusses their control around buildings with snake-proof fences, food and cover removal, use of domestic animals, and persistent killing. Control at fish hatcheries includes water poisoning, funnel traps, burrow fumigation, and use of hogs. Den trapping and gassing are described. Supersedes *Wildlife Leaflet* 257 (1944).

346. Ashbrook, F. G. 1953. Annual fur catch of the United States [1952]. 24 pp.

Reissued from *Wildlife Leaflet* BS-140 (1939).

347. Ashbrook, F. G. 1953. Abstracts of fur laws, 1953–54. 41 pp.

Reissued from *Wildlife Leaflet* BS-118 (1938).

348. Hickie, P. 1953. Inventory of big-game animals of the United States, 1952. 3 pp.

Reissued from *Wildlife Leaflet* BS-342 (1952).

349. Branch of Predator and Rodent Control. 1953. Control of house mice. 4 pp.

Describes house mice (*Mus musculus*), their habits, and how they affect public health. Presents trapping, poisoning, eliminating suitable habitat, and using repellents as control methods.

350. Rosene, W., Jr. 1953. Growing bicolor lespedeza in southeastern States. 3 pp.

Describes bicolor or shrub lespedeza (*Lespedeza bicolor*) as an asset in northern bobwhite (*Colinus virginianus*) habitat. Provides planting information, proper location and soils, and continued maintenance.

351. Webster, C. G. 1954. Nest boxes for wood ducks. 9 pp.

Describes construction, location, and erection of wood and metal wood duck (*Aix sponsa*) nest boxes. Discusses nesting material and use of nest boxes by other wildlife.

352. Leedy, D. L. 1954. Wildlife training and employment. 10 pp.

Describes knowledge necessary for the following aspects of wildlife work: 1) research; 2) administration and management; 3) teaching and extension; 4) outdoor writing; and 5) wildlife photography and

art. Discusses undergraduate and graduate training offered, courses and facilities, and employment opportunities. Provides lists of colleges and universities offering wildlife training.

353. CAROLINE, M. 1953. Cotton rats. 2 pp.

Describes cotton rats, their habits, and control techniques.

354. ELLIOTT, H. N. 1953. Wood rats. 2 pp.

Describes wood rats, their habits, disease transmission, and control measures.

355. LUDEMAN, J. A. 1953. Tree squirrels and chipmunks—their habits and controls. 5 pp.

Describes tree squirrels and chipmunks, their habits, and control methods including repellents, trapping, shooting, and poisoning.

356. BRANCH OF PREDATOR AND RODENT CONTROL. 1957. Ground squirrels and their control. 2 pp.

Describes prairie dogs, their habits, and control methods.

357. BRANCH OF PREDATOR AND RODENT CONTROL. 1956. Prairie dogs and their control. 4 pp.

Briefly describes muskrats (*Ondatra zibethicus*), their life history, and control methods.

358. MERRILL, H. A. 1953. Muskrats. 2 pp.

Briefly describes muskrat (*Ondatra zibethicus*), their habits, and control methods including trapping, barriers, and chemicals.

359. BRANCH OF PREDATOR AND RODENT CONTROL. 1955. The opossum. 2 pp.

Describes opossums (*Didelphis marsupialis*) and discusses their reproduction, habitat, food habits, predators, and control measures.

360. BRANCH OF PREDATOR AND RODENT CONTROL. 1953. Weasels and their control. 1 p.

Describes weasels, their predation on domestic fowl, and control methods.

361. BRANCH OF PREDATOR AND RODENT CONTROL. 1950. Use of warfarin for the control of rats and mice. 4 pp.

Discusses warfarin, its use as a rat and mouse poison, and its danger to other animals. Describes how warfarin is used in baits, how it should be applied, and where it can be obtained. Mentions warfarin's advantages over other controls and illustrates protected feeding stations.

362. ASHBROOK, F. G. 1954. Annual fur catch of the United States, 1953–54. 24 pp.

Reissued from *Wildlife Leaflet* BS-140 (1939).

363. ASHBROOK, F. G. 1954. Abstract of fur laws, 1954–55. 39 pp.

Reissued from *Wildlife Leaflet* BS-118 (1938).

364. HICKIE, P. 1954. Inventory of big-game animals of the United States. 3 pp.

Reissued from *Wildlife Leaflet* 342 (1952).

365. NEFF, J. A., AND R. T. MITCHELL. 1955. The rope firecracker; a device to protect crops from bird damage. 8 pp.

Briefly describes bird damage problems with agriculture. Discusses materials used, preparation, weatherproofing, and setting up of rope firecrackers. Offers general cautions and suggestions.

366. BRANCH OF WILDLIFE REFUGES. 1955. Public use of National Wildlife Refuges, 1954. 4 pp.

Tabulates 1) total days visitor use, 2) hunting use, 3) fishing use, and 4) miscellaneous use for each National Wildlife Refuge in 1954.

367. ASHBROOK, F. G. 1955. Fur catch in the United States, 1949–54. 24 pp.

Reissued from *Wildlife Leaflet* BS-140 (1939). Supersedes *Wildlife Leaflets* 315, 346, and 362.

368. BRANCH OF WILDLIFE REFUGES. 1955. List of information on the National Wildlife Refuges, 1955. 2 pp.

Lists Fish and Wildlife Service publications describing refuge areas, species protected, and recreational opportunities. Includes refuge bird lists.

369. DIVISION OF INFORMATION. 1955. List of Fish and Wildlife Service informational leaflets on wildlife. 2 pp.

370. DIVISION OF INFORMATION. 1955. List of Fish and Wildlife Service printed publications on wildlife. 2 pp.

371. WEBSTER, C. G. 1955. Selected references on controlled shooting and artificial propagation of wild ducks. 3 pp.

372. BRANCH OF WILDLIFE REFUGES. 1955. List of National Wildlife Refuges, 1955. 11 pp.

Reissued and updated from *Wildlife Leaflet* 179 (1952).

373. BRANCH OF WILDLIFE RESEARCH. 1956. Bird banding. 9 pp.

Revises and updates *Wildlife Leaflet* BS-145 (1939).

374. BRANCH OF GAME MANAGEMENT. 1956. Text of some Federal laws on wildlife protection. 47 pp.

Provides texts of: 1) convention between the United States and Great Britain for migratory bird protection in the United States and Canada, 2) convention between the United States and the United Mexican States for migratory bird and game animal protection, and 3) titles 16, 18, and 19 of the U.S. code.

375. BRANCH OF WILDLIFE REFUGES. 1956. Public use of National Wildlife Refuges, 1955. 4 pp.
Reissued from *Wildlife Leaflet* 366 (1955).

376. BRANCH OF WILDLIFE RESEARCH. 1956. Inventory of big-game animals of the United States, 1954. 3 pp.
Reissued from *Wildlife Leaflet* 342 (1952).

377. BRANCH OF WILDLIFE REFUGES. 1956. 1956 Address list of refuge managers. 8 pp.

378. BULLARD, C. O. 1956. List of Fish and Wildlife Service informational leaflets on wildlife. 2 pp.
Supersedes *Wildlife Leaflet* 369 (1955).

379. BULLARD, C. O. 1956. List of Fish and Wildlife Service printed publications on wildlife. 2 pp.
Supersedes *Wildlife Leaflet* 370 (1955).

380. ASHBROOK, F. G. 1956. Fur catch in the United States, 1955. 3 pp.
Reissued from *Wildlife Leaflet* BS-140 (1939).

381. [Not issued]

382. BRANCH OF WILDLIFE REFUGES. 1957. 1957 Address list of refuge managers. 8 pp.

383. BRANCH OF WILDLIFE REFUGES. 1957. Public use of National Wildlife Refuges, 1956. 4 pp.
Reissued from *Wildlife Leaflet* 375 (1956).

384. BRANCH OF WILDLIFE REFUGES. 1957. Refuge bird lists. 2 pp.

385. MITCHELL, R. T., AND J. T. LINEHAN. 1957. Protecting corn from blackbirds. 7 pp.
Describes damage by blackbirds, in particular by red-winged blackbirds (*Agelaius phoeniceus*) and common (purple) grackles (*Quiscalus quiscula*). Discusses bird-frightening devices and cultural practices useful in damage prevention.

386. LINEHAN, J. T., AND L. M. LLEWELLYN. 1957. An improved box trap for small game and fur animals. 4 pp.
Describes aluminum-framed box trap and discusses results of comparison tests of this trap with an older wooden model.

387. BRANCH OF WILDLIFE RESEARCH. 1957. Big game inventory for 1955. 4 pp.
Reissued from *Wildlife Leaflet* 376 (1956) to fit 1955.

388. BRANCH OF WILDLIFE RESEARCH. 1957. Fur Catch in the United States, 1956. 3 pp.
Succeeds *Wildlife Leaflet* 380 (1956).

389. BRANCH OF WILDLIFE RESEARCH. 1957. Nutrias in the United States. 11 pp.
Revises and updates *Wildlife Leaflet* 319 (1949).

390. BRANCH OF WILDLIFE REFUGES. 1957. Availability of surplus big-game animals on National Wildlife Refuges. 6 pp.
Supersedes *Wildlife Leaflet* 341 (1952).

391. DIVISION OF INFORMATION. 1954. Selected list of fish and wildlife materials for conservation education. 2 pp.

392. STICKEL, L. F., AND P. F. SPRINGER. 1957. Pesticides and wildlife. 12 pp.
Attempts to answer questions about present and future effects of pesticides on wildlife. Discusses use and types of pesticides, damage to wildlife, safeguards, and alternatives. Specifically mentions DDT, Dutch elm disease, gypsy moth, spruce bud worm, mosquito control, fire ant, and Mediterranean fruit fly.

393. WEBSTER, C. G. 1958. Better nest boxes for wood ducks. 18 pp.
Mentions use of nest boxes by other animals, and explains predator-proofing of nest boxes. Discusses constructing, locating, and erecting nest boxes, and mentions nesting material.

394. DIVISION OF INFORMATION. 1958. Selected list of Fish and Wildlife materials for conservation education. 2 pp.
Succeeds *Wildlife Leaflet* 391 (1954).

395. BRANCH OF WILDLIFE RESEARCH. 1958. Big game inventory for 1956. 3 pp.
Supersedes *Wildlife Leaflet* 387 (1957).

396. BRANCH OF WILDLIFE REFUGES. 1958. Public use of National Wildlife Refuges, 1957. 4 pp.
Supersedes *Wildlife Leaflet* 383 (1957).

397. BRANCH OF WILDLIFE REFUGES. 1958. Address list of refuge managers, 1958. 8 pp.
Supersedes *Wildlife Leaflet* 382 (1957).

398. BRANCH OF WILDLIFE RESEARCH. 1958. Fur catch in the United States, 1957. 3 pp.
Supersedes *Wildlife Leaflet* 388 (1957).

399. BRANCH OF WILDLIFE RESEARCH. 1958. Big game inventory for 1957. 3 pp.
Supersedes *Wildlife Leaflet* 395 (1958).

400. ANONYMOUS. 1960. List of *Wildlife Leaflets* 301-399. 8 pp.

401. BUREAU OF SPORTS FISHERIES AND WILDLIFE. 1959. Raccoons and their control. 2 pp.
Discusses trapping as control method and describes dirt hole, cubby, and water sets.

402. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1959. Anticoagulant rodenticides for control of rats and mice. 4 pp.

Describes effects of anticoagulants and discusses dry and water baits. Provides instructions for placing bait stations.

403. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1959. Control of tree squirrels. 4 pp.

Briefly describes tree squirrels and their life history. Discusses repellent methods, tree and shrub protection, livetrapping, kill trapping, shooting, and poisoning.

404. [Not issued]

405. U.S. FISH AND WILDLIFE SERVICE. 1959. Conservation notes—birds. 4 pp.

Briefly discusses birds, their foods, nests, eggs, migration, and sizes. Mentions dangers to birds, extinct species, banding, and protection.

406. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1959. 1958 Public use of National Wildlife Refuges. 4 pp.

Tabulates hunting, fishing, miscellaneous, and total use for each refuge by region.

407. U.S. FISH AND WILDLIFE SERVICE. 1959. Publications on the National Wildlife Refuges—1959. 4 pp.

408. BRANCH OF WILDLIFE REFUGES. 1959. 1959 Address list of refuge managers. 8 pp.

409. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1962. Bird control devices—sources of supply. 4 pp.

Mentions regulations and gives suppliers' addresses for various control devices.

410. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1959. Fur catch in the United States, 1958. 3 pp.

Revised from *Wildlife Leaflet* BS-140 (1939).

411. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1959. Big game inventory for 1958. Compiled in Bird and Mammal Laboratories, Branch of Wildlife Research. 4 pp.

Revises *Wildlife Leaflet* BS-342 (1952).

412. DALE, F. H. 1960. Management of the ring-necked pheasant. 4 pp.

Revises *Wildlife Leaflet* BS-332 (1951).

413. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1960. Controlling birds—vagrant domestic pigeons. 4 pp.

Supersedes *Wildlife Leaflet* 254 (1948).

414. EDITORIAL SECTION, OFFICE OF INFORMATION. 1960. Selected list of fish and wildlife materials for conservation education. 2 pp.

415. U.S. FISH AND WILDLIFE SERVICE. 1960. Selected list of informational leaflets on wildlife.

Includes leaflets on general conservation of wildlife, training and employment, animals, birds, National Wildlife Refuges, wildlife control, and wildlife diseases.

416. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1960. 1960 Address list of refuge managers. 8 pp.

417. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1960. Brief manual on control of domestic mice and rats. 7 pp. [In Spanish]

Discusses rats and mice and describes control methods including trapping and poisoning.

418. ROBBINS, C. S. 1960. Status of the bald eagle, summer of 1959. 8 pp.

Discusses bald eagle (*Haliaeetus leucocephalus*) breeding range, winter range, migration, reproduction rate decrease, Florida breeding population decrease, and winter populations.

419. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1960. Public use of National Wildlife Refuges—1959. 4 pp.

Tabulates hunting, fishing, miscellaneous, and total use for each refuge by region.

420. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1960. Public use of National Wildlife Refuges—1951 to 1959. 1 p.

Tabulates hunting, fishing, miscellaneous, and total use for each refuge by region, for each year.

421. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1960. Moles and their control. 4 pp.

Describes moles and their food habits, and mentions the eastern American mole (*Scalopus aquaticus*), the star-nosed mole (*Condylura cristata*), and the western American mole (*Scapanus orarius*).

422. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1960. Publications on the National Wildlife Refuges—1960. 4 pp.

423. MEANLEY, B., AND R. T. MITCHELL. 1960. Selected bibliography of the red-winged blackbird. 8 pp. Discusses life history, economic status, and control of the red-winged blackbird (*Agelaius phoeniceus*).

424. BRANCH OF WILDLIFE RESEARCH. 1960. Fur catch in the United States, 1959. 3 pp.

Revises *Wildlife Leaflet* BS-140 (1939).

425. BRANCH OF WILDLIFE RESEARCH. 1960. Big game inventory for 1959. 4 pp.

Updates *Wildlife Leaflet* 346 (1953).

426. DALE, F. H. 1951. Bobwhite propagation and management. 4 pp.

Supersedes *Wildlife Leaflet* 335 (1951).

427. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1961. Directory—National Wildlife Refuges. 13 pp.

428. MEANLEY, B., AND J. S. WEBB. 1960. Distribution of winter blackbird roosts east of the Appalachians. 4 pp.

Gives map of distribution of known major roosts and discusses daily movement.

429. ALDRICH, J. W., C. S. ROBBINS, AND W. W. DYKSTRA. 1961. Bird hazard to aircraft. 10 pp.

Discusses history of the problem, seasonal bird concentrations, and conditions that attract birds to airports. Describes remedial measures and scare devices. Mentions other wildlife–aircraft interactions, present research, and lists technical assistance offices.

430. BRANCH OF WILDLIFE REFUGES. 1961. Address list of refuge managers. 8 pp.

431. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1961. 1960 Public use of National Wildlife Refuges. 4 pp.

Tabulates hunting, fishing, miscellaneous, and total use for each refuge by region.

432. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1961. Birds protected by Federal law. 4 pp.

433. [Not issued]

434. OFFICE OF INFORMATION. 1961. Selected list of fish and wildlife materials for conservation education. 2 pp.

Subjects include birds, fishes, mammals, and National Wildlife Refuges.

435. U.S. FISH AND WILDLIFE SERVICE. 1961. Revised 1964 and 1972. Federal and State game and fish agencies. 2 pp.

Lists agencies and addresses.

436. BRANCH OF WILDLIFE RESEARCH. 1961. Fur catch in the United States, 1960. 3 pp.

Revises *Wildlife Leaflet* BS-140 (1939).

437. U.S. FISH AND WILDLIFE SERVICE. 1961. Selected list of informational leaflets on wildlife. 2 pp.

Subjects include general wildlife conservation, wildlife training and employment, land animals, birds, National Wildlife Refuges, and wildlife control.

438. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1961. Publications on the National Wildlife Refuges—1961. 4 pp.

439. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1961. 1961 Address list of refuge managers. 8 pp.

440. BRANCH OF WILDLIFE RESEARCH. 1961. Big game inventory for 1960. 4 pp.

Updates *Wildlife Leaflet* 342 (1952).

441. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1962. Selected Federal laws on fish and wildlife conservation and the migratory bird treaties. 4 pp.

Briefly describes provisions of laws that apply to migratory birds.

442. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1962. 1961 Public use of National Wildlife Refuges. 6 pp.

Tabulates hunting, fishing, miscellaneous and total use for each refuge by region.

443. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1962. Public use of National Wildlife Refuges—1951 to 1961. 1 p.

Tabulates hunting, fishing, miscellaneous and total use for each refuge by region, for each year.

444. BRANCH OF WILDLIFE RESEARCH. 1962. Fur catch in the United States, 1961. 3 pp.

Updates *Wildlife Leaflet* BS-140 (1939).

445. MANVILLE, R. H. 1962. The nutria in the United States. 4 pp.

Discusses nutria (*Myocastor coypus*) natural history, establishment in the United States, economic importance, and use as a fur crop.

446. BRANCH OF WILDLIFE RESEARCH. 1962. Big game inventory for 1961. 4 pp.

Revises *Wildlife Leaflet* 342 (1952).

447. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1963. Directory of National Wildlife Refuges. 2 pp.

Lists recent refuges and recent acreage changes.

448. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1962. 1962 Address list of refuge managers. 9 pp.

449. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1963. 1962 Public use of National Wildlife Refuges. 6 pp.

Revises *Wildlife Leaflet* 442 (1962).

450. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1963. Publications on National Wildlife Refuges. 4 pp.

451. U.S. FISH AND WILDLIFE SERVICE. 1963. Selected list of information leaflets on wildlife. 2 pp.

Revises *Wildlife Leaflet* 437 (1961).

452. BRANCH OF WILDLIFE RESEARCH. 1963. Fur catch in the United States, 1962. 4 pp.

Revises *Wildlife Leaflet* BS-140 (1939).

453. GREENHALL, A. M. 1963. A bamboo mongoose trap. 4 pp.

Illustrates and describes construction of a bamboo trap for Indian mongooses (*Herpestes auropunctatus*).

454. BRANCH OF WILDLIFE RESEARCH. 1963. Big game inventory for 1962. 4 pp.

Revises *Wildlife Leaflet* 342 (1952).

455. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1963. Birds protected by Federal law. 4 pp.

456. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1963. Migratory game birds special permits. 7 pp.

Describes two programs under which special permits for migratory game birds may be issued: 1) salvaging sick and wounded migratory waterfowl, and 2) propagation of rare or endangered species—a cooperative program.

457. BRANCH OF WILDLIFE REFUGES. 1963. 1963 Address list of refuge managers. 11 pp.

458. WEBSTER, C. G., AND F. M. UHLER. 1964. Improved nest structures for wood ducks. 20 pp.

Revises *Wildlife Leaflet* 393 (1958).

459. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1964. Public use of National Wildlife Refuges. 6 pp.

Revises *Wildlife Leaflet* 442 (1962).

460. DIVISION OF WILDLIFE RESEARCH. 1964. Fur catch in the United States, 1963. 4 pp.

Revises *Wildlife Leaflet* BS-140 (1939).

461. DIVISION OF WILDLIFE RESEARCH. 1964. Big game inventory for 1963. 4 pp.

Revises *Wildlife Leaflet* 342 (1962).

462. DIVISION OF WILDLIFE REFUGES. 1964. 1964 Address list of refuge managers. 12 pp.

463. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1964. Recreational policy on National Wildlife Refuges. 4 pp.

Discusses when recreation is authorized, uses directly or indirectly associated with wildlife, services and facilities, fees and charges, and visitor control and protection.

464. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1964. Manufacturers of chemical animal repellents. 4 pp.

465. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1964. Manufacturers or importers of rodenticides and accessories. 4 pp.

466. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1965. Directory of National Wildlife Refuges. 18 pp.

467. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1965. Trapping starlings. 2 pp.

Describes and illustrates methods of trapping European starlings (*Sturnus vulgaris*).

468. U.S. FISH AND WILDLIFE SERVICE. 1965. Selected list of information leaflets on wildlife. 2 pp.

Revises *Wildlife Leaflet* 437 (1961).

469. DIVISION OF MANAGEMENT AND ENFORCEMENT. 1965. Birds protected by federal law. 4 pp.

470. DIVISION OF WILDLIFE RESEARCH. 1965. Big game inventory for 1964. 4 pp.

Revises *Wildlife Leaflet* 342 (1962).

471. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1965. Fur catch in the United States, 1964. 4 pp.

Revises *Wildlife Leaflet* BS-140 (1939).

472. DIVISION OF MANAGEMENT AND ENFORCEMENT. 1966. Birds protected by Federal law. 2 pp.

473. DIVISION OF WILDLIFE RESEARCH. 1966. Big game inventory for 1965. 4 pp.

Revises *Wildlife Leaflet* 342 (1952).

474. DIVISION OF WILDLIFE RESEARCH. 1966. Fur catch in the United States, 1965. 4 pp.

Updates *Wildlife Leaflet* BS-140 (1939).

475. DIVISION OF MANAGEMENT AND ENFORCEMENT. 1967. Birds protected by Federal law. 4 pp.

476. MITCHELL, R. T., AND J. T. LINEHAN. 1967. Protecting corn from blackbirds. 8 pp.

Describes and illustrates the red-winged blackbird (*Agelaius phoeniceus*), brown-headed cowbird (*Molothrus ater*), starling (*Sturnus vulgaris*), common grackle (*Quiscalus quiscula*) and American crow (*Corvus brachyrhynchos*), and discusses daily movements and feeding. Protection methods are described.

477. DIVISION OF WILDLIFE RESEARCH. 1967. Big game inventory for 1966. 4 pp.

Revises *Wildlife Leaflet* 342 (1952).

478. DIVISION OF WILDLIFE RESEARCH. 1967. Fur catch in the United States, 1966. 4 pp.

Revises *Wildlife Leaflet* BS-140 (1939).

479. BUREAU OF SPORT FISHERIES AND WILDLIFE. 1967. Selected list of information leaflets on wildlife. 2 pp.

Revises *Wildlife Leaflet* 437 (1961).

480. DIVISION OF MANAGEMENT AND ENFORCEMENT. 1968. Wildlife imported into the United States in 1967. 4 pp.

Tabulates numbers of mammals, wild birds, live fish, mollusks and crustaceans, amphibians, and reptiles imported. Details ports and means of entry and offers some facts about wildlife importations.

481. DIVISION OF WILDLIFE RESEARCH. 1968. Big game inventory for 1967. 4 pp.

Revises *Wildlife Leaflet* 342 (1952).

482. Division of Wildlife Research. 1968. Fur catch in the United States, 1967. 4 pp.

Revises *Wildlife Leaflet* BS-140 (1939).

483. Division of Management and Enforcement. 1969. Wildlife imported into the United States in 1968. 4 pp.

Revises *Wildlife Leaflet* 480 (1968).

484. Rayall, W. C., Jr. 1969. Trapping house sparrows to protect experimental grain crops. 4 pp.

Describes successful attempt to protect grain by trapping house sparrows (*Passer domesticus*) with modified Australian crow traps.

485. Bureau of Sport Fisheries and Wildlife. 1969. Selected list of information leaflets on wildlife. 2 pp.

Revises *Wildlife Leaflet* 437 (1961).

486. Division of Management and Enforcement. 1969. Birds protected by Federal law. 4 pp.

487. Division of Wildlife Research. 1969. Big game inventory for 1968. 4 pp.

Revises *Wildlife Leaflet* 342 (1952).

488. Division of Wildlife Research. 1969. Fur catch in the United States, 1968. 4 pp.

Revises *Wildlife Leaflet* BS-140 (1939).

489. Division of Management and Enforcement. 1970. Selected list of Federal laws and treaties relating to sport fish and wildlife. 4 pp. [Revised 1974]

Briefly describes provisions of acts commonly associated with protection and management of wild mammals, birds, fishes, amphibians, and reptiles.

490. Griffith, R. E., Jr. 1969. A method for filing black and white photographs. 4 pp.

Describes and illustrates method.

491. Division of Management and Enforcement. 1970. Wildlife imported into the United States in 1969. 4 pp.

Revises *Wildlife Leaflet* 480 (1968).

492. Division of Wildlife Research. 1970. Big game inventory for 1969. 4 pp.

Revises *Wildlife Leaflet* 342 (1952).

493. Division of Wildlife Research. 1970. Fur catch in the United States, 1969. 4 pp.

Revises *Wildlife Leaflet* BS-140 (1939).

494. Division of Management and Enforcement. 1970. Birds protected by Federal law. 4 pp.

495. Division of Management and Enforcement. 1971. Wildlife imported into the United States in 1970. 4 pp.

Revises *Wildlife Leaflet* 480 (1968).

496. Bureau of Sport Fisheries and Wildlife. 1971. The South American monk, quaker, or gray-headed parakeet. 4 pp.

Describes the monk parakeet (*Myiopsitta monachus*), its habitat and climate, food, behavior and habits, abundance, interbreeding, competition, relation to agriculture, sporting characteristics, and introduction. Discusses overall implications.

497. Division of Wildlife Research. 1971. Big game inventory for 1970. 4 pp.

Revises *Wildlife Leaflet* 342 (1952).

498. Division of Management and Enforcement. 1972. Wildlife imported into the United States in 1971. 4 pp.

Revises *Wildlife Leaflet* 480 (1968).

499. Division of Wildlife Research. 1971. Fur catch in the United States, 1970. 4 pp.

Revises *Wildlife Leaflet* BS-140 (1939).

500. [Not issued]

501. Bureau of Sport Fisheries and Wildlife. 1972. Wildlife products imported into the United States in 1971. 4 pp.

Lists number of import declarations in 1971 in each of the following categories: 1) manufactured items, 2) skins and hides, 3) feathers, and 4) game trophies.

502. Bureau of Sport Fisheries and Wildlife. 1973. Wildlife imported into the United States in 1972. 4 pp.

Lists numbers of live wildlife import declarations in 1972, in each of the following categories: 1) mammals, 2) birds, 3) live fish, 4) mollusks and crustaceans, 5) amphibians, and 6) reptiles.

503. Bureau of Sports Fisheries. 1973. Wildlife products imported into the United States in 1972. 4 pp.

Updates and revises *Wildlife Leaflet* 501 (1972), adding a fifth category of import declarations: pounds of dead fresh salmonids.

504. Bureau of Sports Fisheries. 1973. Muskrat and nutria control with zinc phosphide. 2 pp.

Presents directions for bait preparation and application for burrows, floating rafts, bait boards, and ground baiting.

505. Stone, C. P., and D. F. Mott. 1973. Bird damage to ripening field corn in the United States, 1971. 8 pp.

Surveys bird damage to field corn. Compares results with 1970 survey to determine year-to-year consistency of damage distribution and intensity.

506. BUSACK, S. D. 1974. Amphibians and reptiles imported into the United States. 36 pp.

The numbers of amphibians and reptiles reported on the U.S. Bureau of Sport Fisheries and Wildlife Form 3-177 for importation into the United States in 1970 and 1971 are presented by general taxonomic groups and for total numbers of living amphibians and reptiles imported. A table is included for skins, parts, and products imported.

507. DODGE, W. E., AND V. G. BARNES, JR. 1975. Movements, home range, and control of porcupines in western Washington. 7 pp.

Radiotelemetry was used to monitor movements of 18 North American porcupines (*Erethizon dorsatum*) in typical west Cascade habitat near Mount St. Helens, Washington. Results are reported and discussed and control methods are suggested.

508. CAMPBELL, D. L., AND J. EVANS. 1975. "Vexar" seedling protectors to reduce wildlife damage to Douglas-fir. 11 pp.

Describes uses of "Vexar" seedling protectors to reduce clipping and browsing damage to regenerating Douglas-fir (*Pseudotsuga menziesii*) by snowshoe hares (*Lepus americanus*), cottontails, black-tailed deer (*Odocoileus hemionus columbianus*), and North American elk (*Cervus elaphus*).

509. TIETJEN, H. P. 1976. Zincphosphide—a control agent for black-tailed prairie dogs. 4 pp.

Provides use instructions and discusses responsible control.

510. U.S. FISH AND WILDLIFE SERVICE. 1976. Nest boxes for wood ducks. 14 pp.

Revises and updates *Wildlife Leaflet* 458 (1964).

511. GREENHALL, A. M. 1977. Birds imported into the United States in 1973 and 1974. 7 pp.

Lists the numbers and species of birds imported into the United States during 1973 and 1974, as well as the country of export.

512. HIGGINS, K. F., L. M. KIRSCH, H. F. DUEBBERT, A. T. KLETT, J. T. LOKEMOEN, H. W. MILLER, AND A. D. KRUSE. 1977. Construction and operation of cable-chain drag for nest searches. 14 pp.

List of materials necessary to build and use a 53-m-long cable-chain drag is presented. Techniques are described for searching, finding, and marking nests in a typical area of grassland. Use of this technique during nine nesting seasons is evaluated. Other uses of the cable-chain drag are also discussed.

513. CAMPBELL, D. L., AND L. E. JOHNSON. 1981. Guide for collecting and seeding native forbs for wildlife in Douglas-fir clearcuts. 13 pp.

Recommends seeding new clearcuts to improve wildlife habitat to reduce feeding injuries to Douglas-fir (*Pseudotsuga menziesii*) by black-tailed deer (*Odocoileus hemionus columbianus*). Lists methods to help identify plants, harvest mature seeds of catsear (*Hypochaeris radicata*), and collect stems to produce mature seeds of hawksbeard (*Crepis capillaris*), fleabane (*Erigeron strigosus septentrionalis*), hawkweed (*Hieracium albiflorum*), phacelia (*Phacelia nemoralis*), and redstem fireweed (*Epilobium watsonii watsonii*). Seed cleaning, germination, and storage methods are described, and seeding seasons are suggested.

514. EVANS, J., D. L. CAMPBELL, G. D. LINDSEY, V. G. BARNES, JR., AND R. M. ANTHONY. 1981. Distribution of animal damage in southwestern Oregon forests. 12 pp.

Describes field survey portion of an investigation conducted in 1980 to define the extent of animal damage to conifer regeneration in southwestern Oregon, and to identify species causing the damage.

515. RUELLE, P., AND R. L. BRUGGERS. 1983. Senegal's trade in cage birds, 1979-81. 11 pp.

Describes Senegal's cage bird trade. Updates exportation figures and indicates some legislation proposed by the government of Senegal to manage this industry.

Fish Disease Leaflet

The *Fish Disease Leaflet* series, issued by the National Fish Health Research Laboratory, National Fisheries Research Center–Leetown, U.S. Fish and Wildlife Service, evolved from the more generalized *Fishery Leaflet* series to meet the needs of hatchery personnel and of fish health instructors in providing specific and timely information on fish diseases. Each *Fish Disease Leaflet* discusses a particular disease or a combination of related diseases, and gives a brief history of the disease, its etiology, clinical signs, diagnosis, geographic range, occurrence, and methods of control. As new information becomes available, the *Fish Disease Leaflets* are revised or new ones are issued; they are distributed by Technical Information Services, National Fisheries Research Center–Leetown, Box 700, Kearneysville, West Virginia 25430.

1. WOLF, K. 1966. Infectious pancreatic necrosis (IPN) of salmonid fishes. (Supersedes *Fishery Leaflet* 453, 1958.) 4 pp.
2. MEYER, F. P. 1974. Parasites of freshwater fishes; II, Protozoa; 3, *Ichthyophthirius multifiliis*. (Issued 1966; revised 1969 and 1974.) 5 pp.
3. BOWEN, J. T., AND R. E. PUTZ. 1966. Parasites of freshwater fish; IV, Miscellaneous; 3, Parasitic copepod *Argulus*. 4 pp.
4. BOWEN, J. T. 1966. Parasites of freshwater fish; IV, Miscellaneous; 4, Parasitic copepods *Ergasilus, Achtheres*, and *Salmincola*. 4 pp.
5. MEYER, F. P. 1966. Parasites of freshwater fishes; IV, Miscellaneous; 6, Parasites of catfishes. 7 pp.
6. WOLF, K. 1966. Viral hemorrhagic septicemia of rainbow trout. (Revised 1972; reprinted 1981 and 1984.) 4 pp.
7. PARISOT, T. J., AND J. W. WOOD. 1966. Fish mycobacteriosis (tuberculosis). (Issued 1966; revised 1970.) 2 pp.
8. WOLF, K. 1966. Bacterial kidney disease of salmonid fishes. (Reprinted 1970; supersedes *Fishery Leaflet* 566, 1964.) 4 pp.
9. HOFFMAN, G. L., S. F. SNIESZKO, AND K. WOLF. 1968. Approved procedure for determining absence of viral hemorrhagic septicemia and whirling disease in certain fish and fish products. (Reissued 1970; reprinted 1981.) 7 pp.
10. [Not issued]
11. SNIESZKO, S. F., AND G. L. BULLOCK. 1968. Freshwater fish diseases caused by bacteria belonging to the genera *Aeromonas* and *Pseudomonas*. (Supersedes *Fishery Leaflet* 459, 1958; revised 1962.) 7 pp.
12. PUTZ, R. E., AND J. T. BOWEN. 1968. Parasites of freshwater fishes; IV, Miscellaneous; The anchor worm (*Lernaea cyprinacea*) and related species. (Supersedes *Fishery Leaflet* 575, 1964.) 4 pp.
13. WOLF, K. 1968. Lymphocystis disease of fish. (Supersedes *Fishery Leaflet* 565, 1964.) 4 pp.
14. WOLF, K. 1969. Virus disease of sockeye salmon. (Supersedes *Fishery Leaflet* 454, 1958.) 3 pp.
15. WOLF, K. 1969. Blue-sac disease of fish (also known as dropsy, yolk sac disease, and *Hydrocoele embryonalis*). (Supersedes *Fishery Leaflet* 455; revised 1963.) 4 pp.
16. SNIESZKO, S. F., AND A. J. ROSS. 1969. Columnaris disease of fishes. (This leaflet was issued in November 1969 and is a revision of *Fish Disease Leaflet* 16 of February 1969; supersedes *Fishery Leaflet* 461, 1958.) 4 pp.
17. SNIESZKO, S. F. 1969. Fish furunculosis. (Supersedes *Fishery Leaflet* 467, 1958.) 4 pp.
18. PLUMB, J. A. 1972. Channel catfish virus disease. (Revision of *Fish Disease Leaflet* 18, 1969, by Wellborn, Fijan, and Naftel.) 4 pp.
19. SNIESZKO, S. F. 1970. Bacterial gill disease of freshwater fishes. (Supersedes *Fishery Leaflet* 464, 1958.) 4 pp.
20. PUTZ, R. E. 1969. Parasites of freshwater fishes; II, Protozoa; 1, Microsporida of fishes. (Supersedes *Fishery Leaflet* 571; revised November 1969.) 4 pp.
21. HOFFMAN, G. L. 1969. Parasites of freshwater fish; I, Fungi; 1, Fungi (*Saprolegnia* and relatives) of fish and fish eggs. (Supersedes *Fishery Leaflet* 564, 1963; reprinted 1981.) 6 pp.
22. WOLF, K. 1970. White-spot disease of fish eggs and fry. (Supersedes *Fishery Leaflet* 456, 1958.) 3 pp.

23. SNIESZKO, S. F. 1970. Nutritional (dietary) gill disease and other less known gill diseases of freshwater fishes. (Supersedes *Fishery Leaflet* 463, 1958.) 2 pp.

24. PIPER, R. G. 1970. Ulcer disease in trout. (Supersedes *Fishery Leaflet* 466.) 3 pp.

25. BULLOCK, G. L., AND S. F. SNIESZKO. 1970. Fin rot, coldwater disease, and peduncle disease of salmonid fishes. (Supersedes *Fishery Leaflet* 462, 1958; reprinted 1981, 1984.) 3 pp.

26. SNIESZKO, S. F., F. T. WRIGHT, G. L. HOFFMAN, AND K. WOLF. 1970. Selected fish disease publications in English. (Supersedes *Fishery Leaflet* 570, 1964.) 7 pp.

27. AMEND, D. F., AND G. WEDEMEYER. 1970. Approved procedure for determining absence of infectious pancreatic necrosis (IPN) virus in certain fish and fish products. 4 pp.

28. HOFFMAN, G. L. 1970. Control and treatment of parasitic diseases of freshwater fishes. (Supersedes *Fishery Leaflet* 486, 1959.) 7 pp.

29. ROSS, A. J. 1970. Vibriosis in fish. 3 pp.

30. PARISOT, T. J. 1970. Sacramento River chinook disease (SRCD). (Supersedes *Fishery Leaflet* 562, 1963.) 2 pp.

31. AMEND, D. F. 1970. Approved procedure for determining absence of infectious hematopoietic necrosis (IHN) in salmonid fishes. (Reprinted 1981.) 4 pp.

32. HERMAN, R. L. 1971. Visceral granuloma and nephrocalcinosis. 2 pp.

33. WRIGHT, F. T. 1971. List of reference sources for students of fish diseases. (Supersedes *Fishery Leaflet* 570, 1964; and *Fish Disease Leaflet* 26, 1970.) 11 pp.

34. WOLF, K. 1971. Soft-egg disease of fishes. (Supersedes *Fishery Leaflet* 457, 1958.) 1 p.

35. WOLF, K., AND M. C. QUIMBY. 1973. Fish virology: procedures and preparation of materials for plaquing fish viruses in normal atmosphere. 13 pp.

36. SNIESZKO, S. F. 1974. Nutritional (dietary) gill disease and other less known gill diseases of freshwater fishes. (Revision of *Fish Disease Leaflet* 23, 1970; supersedes *Fishery Leaflet* 463, 1958; reprinted 1981.) 2 pp.

37. WOLF, K. 1974. Rhabdovirus disease of northern pike fry. 4 pp.

38. WEDEMEYER, G. A., AND J. W. WOOD. 1974. Stress as a predisposing factor in fish diseases. (Reprinted 1981 and 1984.) 8 pp.

39. AMEND, D. F. 1974. Infectious hematopoietic necrosis (IHN) virus disease. (Supersedes *Fishery Leaflet* 454, 1958; *Fish Disease Leaflet* 14, 1969; and *Fish Disease Leaflet* 30, 1970.) 6 pp.

40. SNIESZKO, S. F., AND G. L. BULLOCK. 1974. Diseases of freshwater fishes caused by bacteria of the genera *Aeromonas, Pseudomonas*, and *Vibrio*. (Supersedes *Fishery Leaflet* 459, 1958 and 1962; and *Fish Disease Leaflet* 11, 1968.) 10 pp.

41. BULLOCK, G. L., H. M. STUCKEY, AND K. WOLF. 1975. Bacterial kidney disease of salmonid fishes. 7 pp.

42. BULLOCK, G. L., AND S. F. SNIESZKO. 1975. Hagerman redmouth, a disease of salmonids caused by a member of the Enterobacteriaceae. 5 pp.

43. SNIESZKO, S. F., AND G. L. BULLOCK. 1975. Fish furunculosis. (Supersedes *Fish Disease Leaflet* 17, 1969; and *Fishery Leaflet* 467, 1958.) 10 pp.

44. WOLF, K., T. SANO, AND T. KIMURA. 1975. Herpesvirus disease of salmonids. 8 pp.

45. SNIESZKO, S. F., AND G. L. BULLOCK. 1976. Columnaris disease of fishes. (Supersedes *Fishery Leaflet* 461, 1958; and *Fish Disease Leaflet* 16, 1969.) 10 pp.

46. HOFFMAN, G. L. 1976. Parasites of freshwater fishes. IV. Miscellaneous. The anchor parasite (*Lernaea elegans*) and related species. (Supersedes *Fishery Leaflet* 575, 1964; and *Fish Disease Leaflet* 12, 1968; reprinted 1981.) 8 pp.

47. HOFFMAN, G. L. 1976. Whirling disease of trout. (Revision of *Fishery Leaflet* 508, 1962.) 10 pp.

48. HOFFMAN, G. L. 1977. Copepod parasites of freshwater fish: *Ergasilus, Achtheres*, and *Salmincola*. (Supersedes *Fish Disease Leaflet* 4, 1966.) 10 pp.

49. HOFFMAN, G. L. 1977. *Argulus*, a Branchiuran parasite of freshwater fishes. (Supersedes *Fish Disease Leaflet* 3, 1966, 1969, and 1974.) 9 pp.

50. BULLOCK, G. L. 1977. Vibriosis in fish. (Supersedes *Fish Disease Leaflet* 29, 1970.) 11 pp.

51. AHNE, W., AND K. WOLF. 1977. Spring viremia of carp. 11 pp.

52. PLUMB, J. A. 1977. Channel catfish virus disease. (Supersedes *Fish Disease Leaflet* 18, 1969 and 1972.) 8 pp.

53. MANN, J. A. 1978. Diseases and parasites of fishes: an annotated bibliography of books and symposia, 1904–1977. Supersedes *Fishery Leaflet* 570, 1964; *Fish Disease Leaflet* 26, 1970; and *Fish Disease Leaflet* 33, 1971.) 28 pp.

54. BULLOCK, G. L. 1978. Pasteurellosis of fishes. 7 pp.

55. SNIESZKO, S. F. 1978. Mycobacteriosis (tuberculosis) of fishes. (Supersedes *Fish Disease Leaflet* 7, 1966 and 1970.) 9 pp.

56. LEWIS, D. H., AND L. R. UDEY. 1978. Meningitis in fish caused by an asporogenous anaerobic bacterium. 5 pp.

57. BULLOCK, G. L., AND S. F. SNIESZKO. 1979. Enteric redmouth disease of salmonids. (Supersedes *Fish Disease Leaflet* 42, 1975.) 7 pp.

58. JOHNSON, K. A., J. E. SANDERS, AND J. L. FRYER. 1979. *Ceratomyxa shasta* in salmonids. (Also published as *Oregon Agricultural Experiment Station Technical Paper* 5130.) 11 pp.

59. MITCHELL, A. J., AND G. L. HOFFMAN. 1980. Important tapeworms of North American freshwater fishes. 18 pp.

60. BULLOCK, G. L. 1980. Bacterial kidney disease of salmonid fishes caused by *Renibacterium salmoninarum*. (Supersedes *Fish Disease Leaflet* 41, 1975.) 10 pp.

61. [Not issued]

62. SNIESZKO, S. F. 1981. Bacterial gill disease of freshwater fishes. (Supersedes *Fishery Leaflet* 464, 1958 and 1970; and *Fish Disease Leaflet* 19, 1970.) 11 pp.

63. BULLOCK, G. L. 1981. Streptococcal infections of fishes. 7 pp.

64. HERMAN, R. L. 1981. Visceral granuloma and nephrocalcinosis. (Supersedes *Fish Disease Leaflet* 32, 1971.) 3 pp.

65. MCALLISTER, P. E. 1983. Infectious pancreatic necrosis (IPN) of salmonid fishes. (Supersedes *Fishery Leaflet* 453, 1958; and *Fish Disease Leaflet* 1, 1966.) 12 pp.

66. BULLOCK, G. L., R. C. CIPRIANO, AND S. F. SNIESZKO. 1983. Furunculosis and other diseases caused by *Aeromonas salmonicida*. (Supersedes *Fishery Leaflet* 467, 1958; *Fish Disease Leaflet* 17, 1969; and *Fish Disease Leaflet* 43, 1975.) 29 pp.

67. BULLOCK, G. L. 1984. Enteric redmouth disease of salmonids. (Supersedes *Fish Disease Leaflet* 57, 1979; and *Fish Disease Leaflet* 42, 1975.) 14 pp.

68. CIPRIANO, R. C., G. L. BULLOCK, AND S. W. PYLE. 1984. *Aeromonas hydrophila* and motile aeromonad septicemias of fish. (Supersedes *Fishery Leaflet* 459, 1958 and 1962; *Fish Disease Leaflet* 11, 1968; and *Fish Disease Leaflet* 40, 1976.) 23 pp.

69. WOLF, K., AND M. E. MARKIW. 1985 Salmonid whirling disease. (Supersedes *Fish Disease Leaflet* 47, 1976.) 12 pp.

Investigations in Fish Control

Investigations in Fish Control **contains technical reports about fish control research conducted at the National Fisheries Research Center–LaCrosse, Wisconsin. This series continues a series formerly included in the *Resource Publication* series. Publications are typeset and have a standard size of 20 × 26 cm (7 7/8 × 10 1/4 in.); length varies. Intended audiences are research scientists and technically trained management personnel. The series was first issued in 1964. Copies are available from the National Fisheries Research Center–LaCrosse, Office of Technical Information, P.O. Box 818, LaCrosse, Wisconsin 54601.**

1. LENNON, R. E., AND C. R. WALKER. 1964. Laboratories and methods for screening fish-control chemicals. 15 pp.

   Describes the physical and technical facilities and procedures of the Fish Control Laboratories at LaCrosse, Wisconsin, and Warm Springs, Georgia. Describes three levels of screening of chemicals for use in fishery management.

2. WALKER, C. R., R. E. LENNON, AND B. L. BERGER. 1964. Preliminary observations on the toxicity of antimycin A to fish and other aquatic animals. 18 pp.

   Preliminary tests were made to evaluate the effects of antimycin A at concentrations of 0.01 to 120 ppb on 24 freshwater fish species in the laboratory and 25 species in outdoor pools. Responses of a select group of other animals and aquatic plants are discussed.

3. HENEGAR, D. L. 1966. Minimum lethal levels of toxaphene as a piscicide in North Dakota lakes. 16 pp. [Also issued as *Resource Publication* 7]

   To determine the minimum levels of toxaphene lethal to fishes in prairie lakes and reservoirs, 16 North Dakota lakes—ranging from 6.3 to 915 acres—were treated in 1959 and 1960 with concentrations of toxaphene ranging from 0.005 to 0.035 ppm. Physical and chemical studies were made of each area, hydrological maps were prepared, and test netting was carried out before and after treatment.

4. NEEDHAM, R. G. 1966. Effects of toxaphene on plankton and aquatic invertebrates in North Dakota lakes. 16 pp. [Also issued as *Resource Publication* 8]

   The effects of low concentrations of toxaphene on plankton and larger invertebrates were studied in four North Dakota lakes (a fifth lake, untreated, was a control). *Brachionus, Keratella, Trichocerca, Asplanchna, Polyarthra, Conochiloides, Daphnia, Ceriodaphnia, Bosmina,* and *Cyclops* were dominant zooplankters.

5. WARNICK, D. C. 1966. Growth rates of yellow perch in two North Dakota lakes after population reduction with toxaphene. 9 pp. [Also issued as *Resource Publication* 9]

   Growth rates of yellow perch (*Perca flavescens*) that survived a toxaphene treatment in Brush and Long lakes in North Dakota were calculated by the scale method for the 1960 and 1961 growing seasons.

6. MAHDI, M. A. 1966. Mortality of some species of fish to toxaphene at three temperatures. 10 pp. [Also issued as *Resource Publication* 10]

   Lethal concentrations of toxaphene were determined for the central stoneroller (*Campostoma anomalum*), golden shiner (*Notemigonus crysoleucas*), goldfish (*Carassius auratus*), black bullhead (*Ictalurus melas*), and bluntnose minnow (*Pimephales notatus*) in water at 53, 63, and 73°F. Rainbow trout (*Salmo gairdneri*) were tested at 53°F. The TL_m and LD50 were obtained by graphic methods. For comparison a normit method was used with the bluntnose minnow data.

7. GAYLORD, W. E., AND B. R. SMITH. 1966. Treatment of East Bay, Alger County, Michigan, with toxaphene for control of sea lampreys. 7 pp. [Also issued as *Resource Publication* 11]

   An experiment was conducted to determine whether toxaphene could be used to eradicate lake-dwelling sea lampreys (*Petromyzon marinus*) and to determine its effect on fish populations. In East Bay, a 78-acre lake on the Sucker River, Alger County, Michigan, an estimated concentration of 100 ppb was maintained for 14 days.

8. MEEHAN, W. R., AND W. L. SHERIDAN. 1966. Effects of toxaphene on fishes and bottom fauna of Big Kitoi Creek, Afognak Island, Alaska. 9 pp. [Also issued as *Resource Publication* 12]

   Big Kitoi Creek, on Afognak Island, Alaska, was treated with toxaphene in July 1961 to remove sculpins (*Cottus aleuticus*) predaceous on pink salmon fry (*Oncorhynchus gorbuscha*). Dispersion

and penetration of toxaphene into the streambed were determined, as well as time required for detoxification. Numbers, weight, recruitment, and species composition of bottom fauna, insects, and other invertebrate groups were also monitored.

9. WALKER, C. R., R. J. STARKEY, AND L. L. MARKING. 1966. Relation of chemical structure to fish toxicity in nitrosalicylanilides and related compounds. 12 pp. [Also issued as *Resource Publication* 13]

   Relations between chemical structures of salicylanilides and benzanilides and their toxicity to rainbow trout (*Salmo gairdneri*) and goldfish (*Carassius auratus*) were evaluated in standard, static bioassays. Single and multiple substitutions of alkyl-, nitro-, and halo-groups were tested.

10. MARKING, L. L. 1966. Evaluation of *p,p′*-DDT as a reference toxicant in bioassays. 10 pp. [Also issued as *Resource Publication* 14]

    p,p′-DDT was tested as a reference standard toxicant against 19 species of freshwater fish, including 39 lots from 10 sources. The rapidity, nonselectivity, and consistency of its toxicity to fish were evaluated in 96-h static bioassays.

11. SCHOETTGER, R. A., AND A. M. JULIN. 1966. Evaluation of an electronic method of measuring hematocrits of fish. 11 pp. [Also issued as *Resource Publication* 15]

    Investigates 1) the comparability of YSI (Yellow Springs Instrument Company) electronic and centrifuge methods for measuring hematocrits in fish, 2) the reproducibility of electronic hematocrits, and 3) some physiological variables in fish blood that could influence conductivity—specifically, electrolyte and protein concentrations.

12. MARKING, L. L. 1967. Toxicity of MS-222 to selected fishes. 10 pp. [Also issued as *Resource Publication* 18]

    Toxicity of MS-222 to rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), brook trout (*Salvelinus fontinalis*), lake trout (*S. namaycush*), northern pike (*Esox lucius*), bluegill (*Lepomis macrochirus*), and largemouth bass (*Micropterus salmoides*), and walleye (*Stizostedion vitreum*) of various sizes was determined in 15-, 30-, and 60-min and 24-, 48-, and 96-h static bioassays at selected temperatures. Safety indexes were calculated on the basis of brief exposures.

13. SCHOETTGER, R. A., AND A. M. JULIN. 1967. Efficacy of MS-222 as an anesthetic on four salmonids. 15 pp. [Also issued as *Resource Publication* 19]

    MS-222 was tested for its efficacy as an anesthetic for rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), brook trout (*Salvelinus fontinalis*), and lake trout (*S. namaycush*). Effects were noted at various temperatures, exposure times, dosages, pH values, and water hardness levels. Differences between larger and smaller fish were identified.

14. WALKER, C. R., AND R. A. SCHOETTGER. 1967. Method for determining MS-222 residues in fish. 10 pp. [Also issued as *Resource Publication* 20]

    Investigates applicability of a modified Bratton–Marshall method for detecting MS-222 in fish tissues.

15. WALKER, C. R., AND R. A. SCHOETTGER. 1967. Residues of MS-222 in four salmonids following anesthesia. 11 pp. [Also issued as *Resource Publication* 21]

    Residues of MS-222 (tricaine methanesulfonate) in the blood, muscle, liver, and kidney of rainbow trout (*Salmo gairdneri*) and in the muscle of brown trout (*S. trutta*), brook trout (*Salvelinus fontinalis*), and lake trout (*S. namaycush*), were measured by a modified Bratton–Marshall colorimetric method. Temperatures were 7, 12, and 17°C in waters with total hardnesses of 10 to 180 ppm.

16. SCHOETTGER, R. A. 1967. Annotated bibliography on MS-222. 15 pp. [Also issued as *Resource Publication* 22]

    Contains 86 references, most of them annotated, on uses of MS-222 on cold-blooded animals including fish and amphibians.

17. SCHOETTGER, R. A., C. R. WALKER, AND L. L. MARKING. 1967. MS-222 as an anesthetic for channel catfish: its toxicity, efficacy, and muscle residues. 14 pp. [Also issued as *Resource Publication* 33]

    The influences of duration of exposure of MS-222, size of fish, temperature, and water quality on toxicity, efficacy, and residues are discussed for channel catfish (*Ictalurus punctatus*).

18. WILLFORD, W. A. 1966. Toxicity of 22 therapeutic compounds to six fishes. 10 pp. [Also issued as *Resource Publication* 35]

    Twenty-two therapeutic chemicals (18 parasiticides and 4 oral bacteriostats) were tested by bioassays for toxicity to fish. Tests were in 24- and 48-h static bioassays on rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), brook trout (*Salvelinus fontinalis*), lake trout (*S. namaycush*), and bluegill (*Lepomis macrochirus*) at 12°C, and channel catfish (*Ictalurus punctatus*) at 17°C.

19. MARKING, L. L., AND J. W. HOGAN. 1967. Toxicity of Bayer 73 to fish. 13 pp. [Also issued as *Resource Publication* 36]

    Provides and discusses results of study on Bayer 73, a molluscicide sold commercially as Bayluscide, and its toxicity to 18 freshwater fish species. Various temperatures, water qualities and pH's were tested. Discusses biodegradability, efficacy,

and relative safety of Bayer 73 in conjunction with its usefulness as a general fish toxicant.

20. WILLFORD, W. A. 1967. Toxicity of dimethyl sulfoxide (DMSO) to fish. 8 pp. [Also issued as *Resource Publication* 37]

    Toxicities of dimethyl sulfoxide (DMSO) to rainbow trout (*Salmo gairdneri*), brook trout (*Salvelinus fontinalis*), lake trout (*S. namaycush*), carp (*Cyprinus carpio*), black bullhead (*Ictalurus melas*), channel catfish (*Ictalurus punctatus*), green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), and yellow perch were determined in 24-, 48-, and 96-hour static bioassays at 12°C. Toxicity was low, around 30 ppt.

21. HESSELBERG, R. J., AND R. M. BURRESS. 1967. Labor-saving devices for bioassay laboratories. 8 pp. [Also issued as *Resource Publication* 38]

    Three inexpensive pieces of labor-saving apparatus for bioassay laboratory use are described and illustrated. Construction features, material costs, and use of a jar rinser, automatic liquid measuring vessel, and jar emptier are discussed.

22. SCHOETTGER, R. A., AND A. M. JULIN. 1969. Efficacy of quinaldine as an anesthetic for seven species of fish. 10 pp.

    Quinaldine was tested as an anesthetic for rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), brook trout (*Salvelinus fontinalis*), lake trout (*S. namaycush*), channel catfish (*Ictalurus punctatus*), bluegill (*Lepomis macrochirus*), and largemouth bass (*Micropterus salmoides*). The influences of pH, temperature, water hardness, age of quinaldine solutions, and repeated exposures on the efficacy of quinaldine are discussed.

23. MARKING, L. L. 1969. Toxicity of quinaldine to selected fishes. 10 pp.

    Quinaldine was tested as an anesthetic for various sizes of nine fish species in 15-, 30-, and 60-min and 3-, 6-, 24-, 48-, and 96-h static bioassays. The influences of temperature, pH, and water hardness on the efficacy of quinaldine are discussed.

24. LOCKE, D. O. 1969. Quinaldine as an anesthetic for brook trout, lake trout, and Atlantic salmon. 5 pp.

    Quinaldine (2-methylquinoline) was tested as an anesthetic for Atlantic salmon (*Salmo salar*), brook trout (*Salvelinus fontinalis*), and lake trout (*S. namaycush*) at various water temperatures and hardness.

25. BURRESS, R. M., AND C. W. LUHNING. 1969. Field trials of antimycin as a selective toxicant in channel catfish ponds. 12 pp.

26. BERGER, B. L., R. E. LENNON, AND J. W. HOGAN. 1969. Laboratory studies on antimycin A as a fish toxicant. 21 pp.

    Liquid and sand formulations of antimycin A were tested in laboratory waters of various temperatures, hardnesses, pH values, and turbidities against 31 species of freshwater fish of various sizes and life stages.

27. GILDERHUS, P. A., B. L. BERGER, AND R. E. LENNON. 1969. Field trials of antimycin A as a fish toxicant. 21 pp.

    Antimycin A was subjected to field trials as a fish toxicant in 20 ponds and lakes and 5 streams in the East, Midwest, and West of the United States. The formulations of toxicant included three on sand grains, which are designed to release antimycin uniformly within certain depths, and one formulation in a liquid. The influences of pH and water temperature on the efficacy of antimycin A were examined; effects on other aquatic animals were noted.

28. BURRESS, R. M., AND C. W. LUHNING. 1969. Use of antimycin for selective thinning of sunfish populations in ponds. 10 pp.

    Selective removal of bluegills (*Lepomis macrochirus*), redear sunfish (*L. microlophus*), and redbreast sunfish (*L. auritus*) was tested in six soft-water ponds in west-central Georgia by applications of 0.4, 0.6, 0.8, and 1.0 ppb of antimycin in the Fintrol-5 formulation. The influences of season, weather conditions, and water temperature on the efficacy of antimycin are described.

29. HOWLAND, R. M., AND R. A. SCHOETTGER. 1969. Efficacy of methylpentynol as an anesthetic on four salmonids. 11 p.

    Determines the effective concentrations of methylpentynol for anesthetizing rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), brook trout (*Salvelinus fontinalis*), and lake trout (*S. namaycush*). The effects of water hardness, pH, water temperature, and repeated dosages on rate of anesthesia are described.

30. MARKING, L. L. 1969. Toxicity of methylpentynol to selected fishes. 7 pp.

    Methylpentynol was tested in 96-h bioassays for its toxicity to rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), brook trout (*Salvelinus fontinalis*), lake trout (*S. namaycush*), northern pike (*Esox lucius*), channel catfish (*Ictalurus punctatus*), bluegills (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), and walleyes (*Stizostedion vitreum*).

31. SVENDSEN, G. E. 1969. Annotated bibliography on methylpentynol. 7 pp.

    Provides references on fishery uses, biochemistry, physiology, and methods of analysis of methylpentynol.

32. HOGAN, J. W. 1969. Toxicity of Hyamine 3500 to fish. 9 pp.

    The toxicity of Hyamine 3500 to 3 species of trout and 11 species of warmwater fish was determined in static bioassays. Twenty-nine lots of fish from nine sources were used in water at various levels of pH, temperature and total hardness.

33. LANE, T. H., AND H. M. JACKSON. 1969. Voidance time for 23 species of fish. 9 pp.

    Reports on voidance time (time required for food residues to pass through the alimentary canal) observations on fingerlings of 23 species of bioassay fish.

34. HOWLAND, R. M. 1969. Laboratory studies on possible fish-collecting aids with some toxicities for the isomers of cresol. 10 pp.

    The relative merits of quinaldine (2 methylquinoline), McNeil-JR-7464 (dl-1-(l-phenyl-ethyl)-5-(propoxy-carbonyl)-imidazole hydrochloride), and three isomers of cresol (p-methylphenol, o-methylphenol, and m-methylphenol) as collecting agents were determined in a lotic system under laboratory conditions at 12°C. The toxicity of the three cresol isomers to rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), and brook trout (*Salvelinus fontinalis*) was measured in bioassays conducted in standard constituted water, and LC50 values were calculated for exposures of 6, 24, 48, and 96 h. The toxicity of *para*-cresol was also established for common carp (*Cyprinus carpio*), fathead minnow (*Pimephales promelas*), black bullhead (*Ictalurus melas*), channel catfish (*I. punctatus*), bluegill (*Lepomis macrochirus*), and yellow perch (*Perca flavenscens*).

35. SCHOETTGER, R. A. 1970. Toxicity of Thiodan in several fish and aquatic invertebrates. 31 pp.

    Thiodan, a chlorinated hydrocarbon insecticide, was tested on rainbow trout (*Salmo gairdneri*) and their fertilized eggs, western white suckers (*Catostomus commersoni*), *Daphnia magna*, and damselfly naiads. Toxicity was influenced by temperature, length of exposure, and alkaline pH. Deposition and metabolism of Thiodan residues in western white suckers, northern creek chubs (*Semotilus atromaculatus*), and goldfish (*Carassius auratus*) were traced with the aid of carbon-14 labeled Thiodan, and chemical analyses of Thiodan in tissues. A possible metabolic pathyway for Thiodan degradation is discussed.

36. MARKING, L. L. 1970. A method for rating chemicals for potency against fish and other organisms. 8 pp.

    A potency rating is presented by which the toxicity of chemicals to organisms can be assessed with a minimum of data from preliminary bioassays. This method permits effective and rapid evaluation of toxicity when data from preliminary tests are inadequate for statistical analysis.

37. MARKING, L. L., AND W. A. WILLFORD. 1970. Comparative toxicity of 29 nitrosalicylanilides and related compounds to eight species of fish. 11 pp.

    The relative potencies of 29 nitrosalicylanilides and related structures against rainbow trout (*Salmo gairdneri*), goldfish (*Carassius auratus*), common carp (*Cyprinus carpio*), fathead minnows (*Pimephales promelas*), black bullheads (*Ictalurus melas*) green sunfish (*Lepomis cyanellus*), bluegills (*L. macrochirus*), and yellow perch (*Perca flavescens*) were determined in 96-h static bioassays. They varied depending on the type and position of substitutions.

38. MARKING, L. L., E. L. KING, C. R. WALKER, AND J. H. HOWELL. 1970. Toxicity of 33NCS to freshwater fish and sea lampreys. 16 pp.

    The chemical 33NCS (3′-chloro-3-nitrosalicylanilide) was evaluated as a fish control agent and as a larvicide for sea lampreys (*Petromyzon marinus*) at the Fish Control Laboratories of the Bureau of Sport Fisheries and Wildlife and the Hammond Bay Biological Station of the Bureau of Commercial Fisheries. Toxicity was shown to be strongly influenced by variations in water quality.

39. SCHOETTGER, R. A., AND G. E. SVENDSEN. 1970. Effects of antimycin A on tissue respiration of rainbow trout and channel catfish. 10 pp.

    The effects of antimycin A on respiration of the liver, kidneys, brain, and gills of rainbow trout (*Salmo gairdneri*) and channel catfish (*Ictalurus punctatus*) were measured in vivo and in vitro.

40. LENNON, R. E., AND B. L. BERGER. 1970. A resume on field applications of antimycin A to control fish. 19 pp.

    Investigates the toxicity of antimycin A in waters of various salt contents, pH's, and temperatures. A liquid formulation was used in most laboratory trials and in streams. Dry formulations were tested in the laboratory and in lakes and ponds. Discusses nonrepellency of antimycin and its use in partial reclamations and as a selective toxicant.

41. ALLEN, J. L., C. W. LUHNING, AND P. D. HARMAN. 1970. Identification of MS-222 residues in selected fish tissues by thin layer chromatography. 7 pp.

    Thin-layer chromatography was used to identify MS-222 in the presence of background primary aromatic amines in fish muscle, brain, and blood. This method, in which the Bratton–Marshall reaction is used to visualize the spots, gave both the specificity of the Bratton–Marshall reaction for primary aromatic amines and the R_f of MS-222 as tools for identification of the residues.

42. HUNN, J. B. 1970. Dynamics of MS-222 in the blood and brain of freshwater fishes during anesthesia. 8 pp.

    Measures the rate of uptake of MS-222 in the blood and brain of 11 freshwater species during induction of anesthesia.

43. WILLFORD, W. A. 1970. Effect of MS-222 on electrolyte and water content in the brain of rainbow trout. 7 pp.

    Rainbow trout (*Salmo gairdneri*) were exposed to 100 m/L solutions of MS-222 for 1-, 2-, 4-, and 10-min intervals; their brains were analyzed for sodium, potassium, calcium, magnesium, zinc, iron, and water content.

44. SCHNICK, R. A. 1972. A review of literature on TFM (3-trifluoromethyl-4-nitrophenol) as a lamprey larvicide. 31 pp.

45. ALLEN, J. L., C. W. LUHNING, AND P. D. HARMAN. 1972. Residues of MS-222 in northern pike, muskellunge, and walleye. 8 pp.

    Residues of MS-222 (tricaine methanesulfonate) in muscle tissue of northern pike (*Esox lucius*), muskellunge (*E. masquinongy*), and walleye (*Stizostedion vitreum*) following anesthesia were measured by a modified Bratton–Marshall colorimetric method and confirmed by thin-layer chromatography.

46. MARKING, L. L. 1972. Methods of estimating the half-life of biological activity of toxic chemicals in water. 9 pp.

    Methods presented require determination of LC50 values for organisms in aged solutions containing unknown residual concentrations, and concurrent tests of solutions containing known concentrations. Half-life of biological activity is determined by plotting the percent concentrations remaining in aged solutions, or deactivation indices against aging time on cyclic semilogarithmic graph paper.

47. ALLEN, J. L., AND J. B. SILLS. 1973. Preparation and properties of quinaldine sulfate, an improved fish anesthetic. 7 pp.

48. MARKING, L. L., AND V. K. DAWSON. 1973. Toxicity of quinaldine sulfate to fish. 8 pp.

    Acute toxicities of quinaldine sulfate ($QdSO_4$) were determined against selected species of coldwater and warmwater fishes. The LC50's were derived for 3-, 6-, 24-, and 96-h exposures in bioassays with different temperatures, hardnesses, and pH's.

49. GILDERHUS, P. A., B. L. BERGER, J. B. SILLS, AND P. D. HARMAN. 1973. The efficacy of a quinaldine sulfate as an anesthetic for freshwater fish. 9 pp.

    Quinaldine sulfate ($QdSO_4$) was tested for its efficacy on 15 freshwater fish species. The influences of water hardness, water temperature, and pH on efficacy were noted.

50. SILLS, J. B., J. L. ALLEN, P. D. HARMAN, AND C. W. LUHNING. 1973. Residue of quinaldine in ten species of fish following anesthesia with quinaldine sulfate. 9 pp.

    The concentration and persistence of residues of the anesthetic quinaldine in five species each of coldwater and warmwater fishes were measured following treatment with the new formulation quinaldine sulfate. Quinaldine accumulated in relation to increasing temperature, treatment concentration, and length of exposure.

51. LUHNING, C. W. 1973. Methods for simultaneous determination and identification of MS-222 and metabolites in fish tissues. 10 pp.

    The analytical method described detects residues of MS-222 and its metabolites: acetylated MS-222, *m*-aminobenzoic acid, and *m*-acetylaminobenzoic acid. The thin-layer chromatographic procedures are done simultaneously with analytical procedures.

52. LUHNING, C. W. 1973. Residues of MS-222, benzocaine, and their metabolites in striped bass following anesthesia. 11 pp.

    Striped bass (*Morone saxatilis*) were anesthetized in a 100 mg/L solution of MS-222 at 17.5°C. Other striped bass were anesthetized with benzocaine. Residues were measured following anesthesia by a modified Bratton–Marshall colorimetric method and confirmed by thin-layer chromatography.

53. DAWSON, V. K., AND L. L. MARKING. 1973. Toxicity of mixtures of quinaldine sulfate and MS-222 to fish. 11 pp.

    Acute toxicities of mixtures of two fish anesthetics (quinaldine sulfate and MS-222) to coho salmon (*Oncorhynchus kisutch*), rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), brook trout (*Salvelinus fontinalis*), lake trout (*S. namaycush*), carp (*Cyprinus carpio*), channel catfish (*Ictalurus punctatus*), bluegill (*Lepomis macrochirus*), and largemouth bass (*Micropterus salmoides*) of various sizes were determined in 15-, 30-, and 60-min and 24-, 48-, and 96-h static toxicity tests. The effects of various temperatures, water hardnesses, and pH's on the mixture's toxicity were evaluated.

54. GILDERHUS, P. A., B. L. BERGER, J. B. SILLS, AND P. D. HARMAN. 1973. The efficacy of quinaldine sulfate: MS-222 mixtures for the anesthetization of freshwater fish. 9 pp.

    Combinations of quinaldine sulfate ($QdSO_4$) and MS-222 were tested for their efficacy in anesthetizing 14 freshwater fish species. The effects of various pH's and water hardnesses on the efficacy were evaluated.

55. SILLS, J. B., J. L. ALLEN, P. D. HARMAN, AND C. W. LUHNING. 1973. Residues of quinaldine and MS-222 in fish following anesthesia with mixtures of quinaldine sulfate: MS-222. 12 pp.

    Residues of quinaldine and MS-222 in 10 species of fish exposed to mixtures of quinaldine and MS-222 were determined using gas chromatography and spectrophotometry for quinaldine and colorimetry for MS-222. Mean concentrations varied with concentration, temperature, length of exposure, and species.

56. MAKI, A. W., L. D. GEISSEL, AND H. E. JOHNSON. 1975. Toxicity of the lampricide 3-trifluoromethyl-4-nitrophenol (TFM) to 10 species of algae. 17 pp.

    The toxicity of analytical and field grades of the lampricide 3-trifluoromethyl-4-nitrophenol (TFM) to unialgal cultures of four green algae, four blue-green algae, and two species of diatoms was examined in 96-h toxicity tests. Growth was measured by daily optical density readings, cell counts of nonfilamentous species, and a gravimetric determination of maximum standing crop at the end of the tests.

57. KAWATSKI, J. A., M. M. LEDVINA, AND C. R. HANSEN, JR. 1975. Acute toxicities of 3-trifluoromethyl-4-nitrophenol (TFM) and 2',5-dichloro-4'-nitrosalicylanilide (Bayer 73) to larvae of the midge *Chironomus tentans*. 7 pp.

    The toxicants 3-trifluoromethyl-4-nitrophenol (TFM) and 2',5-dichloro-4'-nitrosalicylanilide (Bayer 73) were tested individually and together for toxicity to fourth instar *Chironomus tentans* in laboratory static tests at 22 ± 1 °C. Toxicity varied depending on water hardness.

58. FREMLING, C. R. 1975. Acute toxicity of the lampricide 3-trifluoromethyl-4-nitrophenol (TFM) to nymphs of mayflies (*Hexagenia* sp.). 8 pp.

    A recycling test apparatus and burrow-containing artificial substrates were used to determine the toxicity of the lampricide 3-trifluoromethyl-4-nitrophenol (TFM) against Hexagenia mayfly nymphs. Effects of pH, water hardness, and temperature on toxicity were evaluated.

59. SANDERS, H. O., AND D. F. WALSH. 1975. Toxicity and residue dynamics of the lampricide 3-trifluoromethyl-4-nitrophenol (TFM) in aquatic invertebrates. 9 pp.

    Six species of aquatic invertebrates including scud, *Gammarus pseudolimnaeus*, daphnid, *Daphnia magna*, crayfish, *Orconectes nais*, aquatic sowbug, *Asellus brevicaudus*, damselfly nymph, *Ischnura verticalis*, and a mayfly nymph, *Stenonema* sp. were exposed to TFM in toxicity tests in hard water at 21 °C.

60. MARKING, L. L., AND L. E. OLSON. 1975. Toxicity of the lampricide 3-trifluoromethyl-4-nitrophenol (TFM) to nontarget fish in static tests. 27 pp.

    The toxicity of purified, field grade, and reduced TFM to fish was determined in laboratory toxicity tests. The influence of water hardness, pH, and temperature on TFM toxicity was evaluated, and residual toxicity of TFM in water solutions was determined to evaluate the persistence of the toxicant under aerobic conditions.

61. MARKING, L. L., T. D. BILLS, AND J. H. CHANDLER. 1975. Toxicity of the lampricide 3-trifluoromethyl-4-nitrophenol (TFM) to nontarget fish in flow-through tests. 9 pp.

    Field grade 3-trifluoromethyl-4-nitrophenol (TFM) was tested for acute and chronic toxicity to 11 species of nontarget fish in 4- and 30-day exposures, respectively. The species used were coho salmon (*Oncorhynchus kisutch*), rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), brook trout (*Salvelinus fontinalis*), lake trout (*S. namaycush*), goldfish (*Carassius auratus*), golden shiner (*Notemigonus crysoleucas*), channel catfish (*Ictalurus punctatus*), bluegill (*Lepomis macrochirus*), redear sunfish (*L. microlophus*), and yellow perch (*Perca flavescens*).

62. CHANDLER, J. H., JR., AND L. L. MARKING. 1975. Toxicity of the lampricide 3-trifluoromethyl-4-nitrophenol (TFM) to selected aquatic invertebrates and frog larvae. 7 pp.

    The lampricide 3-trifluoromethyl-4-nitrophenol (TFM) was tested against various groups of nontarget aquatic organisms. Invertebrates exposed were flatworms (*Catenula* sp.), annelids (*Tubifex tubifex*), daphnids (*Daphnia magna*), seed shrimps (*Cypridopsis* sp.), glass shrimp (*Palaemonetes kadiakensis*), mayfly nymphs (*Callibaetis* sp.), backswimmers (*Notonecta* sp.), mosquito larvae (*Culex* sp. and *Anopheles* sp.), bivalve mollusks (*Corbicula* sp., *Sphaerium* sp., *Elliptio* sp., and *Plectomerus* sp.) and snails (*Physa* sp., *Helisoma* sp., and *Pleurocera* sp.). Vertebrates exposed to TFM were larvae of gray tree frogs (*Hyla versicolor*), leopard frogs (*Rana pipiens*), and bullfrogs (*R. catesbeiana*).

63. DAWSON, V. K., K. B. CUMMING, AND P. A. GILDERHUS. 1975. Laboratory efficacy of 3-trifluoromethyl-4-nitrophenol (TFM) as a lampricide. 13 pp.

    The lampricidal activity of 3-trifluoromethyl-4-nitrophenol (TFM) was tested under controlled laboratory conditions to evaluate its response to different levels of pH, water hardness, and temperature, and to various sizes, developmental stages, and species of lampreys.

64. PIAVIS, G. V., AND J. H. HOWELL. 1975. Effects of 3-trifluoromethyl-4-nitrophenol (TFM) on developmental stages of the sea lamprey. 8 pp.

Developing sea lampreys (*Petromyzon marinus*) in stages 1 (zygote) through 17 (burrowing prolarva) were exposed for 24 h to a 10-mg/L (active ingredient) solution of 3-trifluoromethyl-4-nitrophenol (TFM) at 18°C. Embryonic development, incidence of abnormalities, and mortality in the experimentals were compared with those in unexposed controls.

65. SILLS, J. B., AND J. L. ALLEN. 1975. Accumulation and loss of residues of 3-trifluoromethyl-4-nitrophenol (TFM) in fish muscle tissue: laboratory studies. 10 pp.

    Residues of 3-trifluoromethyl-4-nitrophenol (TFM) in the muscle tissue of eight species of fish exposed under controlled conditions were determined by gas chromatography. The concentration of TFM residue varied depending on pH, temperature, hardness of test solutions, and TFM concentration.

66. GILDERHUS, P. A., J. B. SILLS, AND J. L. ALLEN. 1975. Residues of 3-trifluoromethyl-4-nitrophenol (TFM) in a stream ecosystem after treatment for control of sea lampreys. 7 pp.

    Samples of water, bottom soil, plants, invertebrates, and fish for residue analysis were collected from two stations on the East Au Gres River in Michigan before, during, and after treatment of the stream with 3-trifluoromethyl-4-nitrophenol (TFM) for control of sea lampreys (*Petromyzon marinus*).

67. MARKING, L. L., AND V. K. DAWSON. 1975. Method for assessment of toxicity or efficacy of mixtures of chemicals. 8 pp.

    Individual toxic contributions of poisons were summed and additive toxicity was defined by a linear index for two chemicals in combination. Examples were cited from literature and from laboratory tests to assess additive toxicity of selected chemical mixtures to fish.

68. BURRESS, R. M. 1975. Development and evaluation of on-site toxicity test procedures for fishery investigations. 8 pp.

    A simple, inexpensive procedure was developed for conducting on-site tests (bioassays) of the toxicity of various concentrations of antimycin on target and nontarget fishes in waters to be treated. Final modifications and evaluations of the method were made on the basis of treatments of ponds with antimycin in accordance with data derived from these on-site tests. The procedure described is adaptable for tests of many other chemical compounds commonly used by fishery workers.

69. BILLS, T. D., AND L. L. MARKING. 1976. Toxicity of 3-trifluoromethyl-4-nitrophenol (TFM), 2',5-dichloro-4'-nitrosalicylanilide (Bayer 73), and a 98:2 mixture to fingerlings of seven fish species and to eggs and fry of coho salmon. 9 pp.

    The toxicity of the lampricides TFM and Bayer 73, and a 98:2 mixture of these compounds was determined for fingerlings of brown trout (*Salmo trutta*), rainbow trout (*S. gairdneri*), lake trout (*Salvelinus namaycush*), brook trout (*S. fontinalis*), channel catfish (*Ictalurus punctatus*), bluegill (*Lepomis macrochirus*), and yellow perch (*Perca flavescens*), and for eggs and fry of coho salmon (*Oncorhynchus kisutch*).

70. MAKI, A. W., AND H. E. JOHNSON. 1976. The freshwater mussel (*Anodonta* sp.) as an indicator of environmental levels of 3-trifluoromethyl-4-nitrophenol (TFM). 5 pp.

    After freshwater mussels (*Anodonta* sp.) were exposed to 8.68-mg/L solutions of 3-trifluoromethyl-4-nitrophenol (TFM; ^{14}C-TFM and analytical grade TFM) in a model stream for 24 h, the uptake and elimination rates of TFM residues for the foot, gill, and viscera were determined by radioassay.

71. BURRESS, R. M., P. A. GILDERHUS, AND K. B. CUMMING. 1976. Field tests of isobornyl thiocyanoacetate (Thanite) for live collection of fishes. 13 pp.

    Eight ponds containing 28 fish species were treated with isobornyl thiocyanoacetate (Thanite) to test its efficacy for live collection of fish.

72. MARKING, L. L., AND T. D. BILLS. 1976. Toxicity of rotenone to fish in standardized laboratory tests. 11 pp.

    The following treatments were evaluated: 1) the toxicity of rotenone to fish in standardized static and flow-through tests, 2) the toxicity of rotenone to newly fertilized trout eggs, 3) the residual toxicity of rotenone in water after selected periods of aging, 4) the efficiency of two compounds used to detoxify rotenone, and 5) the comparative toxicities of three rotenone formulations.

73. BILLS, T. D., L. L. MARKING, AND J. H. CHANDLER, JR. 1977. Formalin: its toxicity to nontarget aquatic organisms, persistence, and counteraction. 7 pp.

    The acute toxicity of formalin to selected fishes and aquatic invertebrates was determined in standardized laboratory tests. Also evaluated were: 1) the effects of water characteristics on toxicity, 2) the persistence of formalin in water, and 3) the feasibility of counteracting formalin by oxidation or reduction, or removal from the water with activated carbon.

74. MARKING, L. L., AND T. D. BILLS. 1977. Chlorine: its toxicity to fish and detoxification of antimycin. 5 pp.

    The effects of pH, temperature, and water hardness on the toxicity of chlorine were evaluated. Different concentrations of chlorine at different pH levels were tested for detoxification of antimycin.

75. BILLS, T. D., L. L. MARKING, AND J. H. CHANDLER, JR. 1977. Malachite green: its toxicity to aquatic organisms, persistence, and removal with activated carbon. 6 pp.

    Acute toxicity of malachite green was determined for nontarget fish species and aquatic invertebrates. The effects of pH, temperature, and water hardnesses on toxicity were evaluated. The persistence of malachite green in water and its possible removal from water with activated carbon were investigated.

76. MARKING, L. L., T. D. BILLS, AND J. H. CHANDLER, JR. 1977. Toxicity of Furanace to fish, aquatic invertebrates, and frog eggs and larvae. 6 pp.

    The toxicity of Furanace to fish, frog eggs and larvae, and aquatic invertebrates was determined in standardized laboratory tests and in use pattern exposures. Tests were also conducted in aged solutions of Furanace to determine its persistence in water. The effects of temperature, pH, and water hardness on toxicity were evaluated.

77. DAWSON, V. K., K. B. CUMMING, AND P. A. GILDERHUS. 1977. Efficacy of 3-trifluoromethyl-4-nitrophenol (TFM), 2',5-dichloro-4'-nitrosalicylanilide (Bayer 73), and a 98:2 mixture as lampricides in laboratory studies. 11 pp.

    The lampricidal effects of 3-trifluoromethyl-4-nitrophenol (TFM), 2',5-dichloro-4'-nitrosalicylanilide (Bayer 73), and a 98:2 mixture of the two (TFM:2B) were tested against larvae of the sea lamprey (*Petromyzon marinus*) under controlled laboratory conditions. The lampricides were tested in water at temperatures of 7, 12, and 17°C; total hardnesses of 44, 170, and 300 mg/L as $CaCO_3$; and pH values of 6.5, 7.5, and 8.5. Burrowed and free-swimming larvae were tested, and the risk to nontarget organisms was evaluated.

78. SANDERS, H. O. 1977. Toxicity of the molluscicide Bayer 73 and residue dynamics of Bayer 2353 in aquatic invertebrates. 7 pp.

    The molluscicide Bayer 73 (2-aminoethanol salt of 2',5-dichloro-4'-nitrosalicylanilide), was tested against five species of crustaceans and two species of aquatic insects: daphnids (*Daphnia magna*), aquatic sowbugs (*Asellus brevicaudus*), scuds (*Gammarus pseudolimnaeus*), glass shrimp (*Palaemonetes kadiakensis*), crayfish (*Orconectes nais*), damselfly nymphs (*Ischnura verticalis*), and midge larvae (*Chironomus plumosus*). The rates of accumulation and elimination of radioactive residues were evaluated.

79. KAWATSKI, J. A., AND A. E. ZITTEL. 1977. Accumulation, elimination, and biotransformation of the lampricide 2',5-dichloro-4'-nitrosalicylanilide by *Chironomus tentans*. 8 pp.

80. HOUF, L. J., AND R. S. CAMPBELL. 1977. Effects of antimycin A and rotenone on macrobenthos in ponds. 29 pp.

    Samples of macrobenthos, collected over a 14-month period from nine 0.03-ha experimental ponds at the Fish-Pesticide Research Laboratory, Columbia, Missouri, were analyzed to determine the long- and short-term effects of antimycin A and rotenone. The effects on species diversity, emergence, seasonal dynamics, abundance, and relative members of taxa were evaluated.

81. JACOBI, G. Z., AND D. J. DEGAN. 1977. Aquatic macroinvertebrates in a small Wisconsin trout stream before, during, and 2 years after treatment with the fish toxicant antimycin. 24 pp.

    Benthos and benthic drift were sampled periodically in Seas Branch Creek (Vernon County, Wisconsin) for 5 months before and for 2 years after the stream was treated with antimycin, and over the same period in nearby untreated Maple Dale Creek.

82. SCHNICK, R. A., AND K. A. GRAVES. 1977. *Investigations in Fish Control*: index to numbers 1–72, 1964–76. 19 pp.

    Key words from *Investigations in Fish Control* are given, and issue titles, authors, and publication dates are listed.

83. MARKING, L. L., AND J. H. CHANDLER, JR. 1978. Survival of two species of freshwater clams, *Corbicula leana* and *Magnonaias boykiniana*, after exposure to antimycin. 5 pp.

    The Asiatic clam, *Corbicula leana* Prime, and a clam native to the southern United States, *Magnonaias boykiniana*, were exposed to antimycin at several concentrations for various periods and then placed in an untreated earthen pond for posttreatment observation.

84. DWYER, W. P., F. L. MAYER, J. L. ALLEN, AND D. R. BUCKLER. 1978. Chronic and simulated use-pattern exposures of brook trout (*Salvelinus fontinalis*) to 3-trifluoromethyl-4-nitrophenol (TFM). 6 pp.

    The effects of 3-trifluoromethyl-4-nitrophenol (TFM) on brook trout (*Salvelinus fontinalis*) were compared under conditions of continuous (chronic) exposure, and under conditions simulating those used in the application of TFM in tributary streams of the Great Lakes for control of the sea lamprey (*Petromyzon marinus*). Mortality, growth, and reproduction were measured.

85. SCHULTZ, D. P., AND P. D. HARMAN. 1978. Hydrolysis and photolysis of the lampricide 2',5-dichloro-4'-nitrosalicylanilide (Bayer 73). 5 pp.

    The hydrolysis of C-Bayer 2353, the non-salt form of Bayer 73, is investigated in water buffered at various pH's. The photolysis of C-Bayer 2353 on

thin-layer chromatographic plates, on glass slides, and in aqueous solutions is analyzed.

86. SCHNICK, R. A., AND F. P. MEYER. 1978. Registration of thirty-three fishery chemicals: status of research and estimated costs of required contract studies. 19 pp.

Information is given for each chemical, including its sponsor, current (1978) registration status, six research uses, costs of required contract studies, and prognosis for registration of use of each compound.

87. DAWSON, V. K., AND P. A. GILDERHUS. 1979. Ethyl-p-aminobenzoate (benzocaine): efficacy as an anesthetic for five species of freshwater fish. 5 pp.

Ethyl-*p*-aminobenzoate (benzocaine) was tested for its efficacy as an anesthetic for rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), northern pike (*Esox lucius*), carp (*Cyprinus carpio*), and largemouth bass (*Micropterus salmoides*). The toxicity of benzocaine to fish eggs was determined. The effects of pH, temperature, and water hardness on the efficacy of benzocaine were evaluated.

88. LAUNER, C. A., AND T. D. BILLS. 1979. Influences of selected environmental factors on the activity of a prospective fish toxicant, 2-(digeranyl-amino)-ethanol, in laboratory tests. 4 pp.

Fathead minnows (*Pimephales promelas*), brown trout (*Salmo trutta*), and rainbow trout (*S. gairdneri*) were used to assess the influences of temperature, pH, turbidity, ultraviolet light, and aquatic vegetation on the toxicity of an experimental fish toxicant, 2-(digeranylamino)-ethanol (GD-174). The feasibility of chemical counteraction by oxidation or reduction was also examined.

89. HUDSON, R. H. 1979. Toxicities of the lampricides 3-trifluoromethyl-4-nitrophenol (TFM) and the 2-aminoethanol salt of 2',5-dichloro-4'-nitrosalicylanilide (Bayer 73) to four bird species. 5 pp.

The acute oral toxicities of the lampricides 3-trifluoromethyl-4-nitrophenol (TFM) and the 2-aminoethanol salt of 2',5-dichloro-4'nitrosalicylanilide (Bayer 73, Bayluscide) were determined in mallards (*Anas platyrhynchos*), ring-billed gulls (*Larus delawarensis*), northern bobwhites (*Colinus virginianus*), and California quail (*Callipepla californicus*). Both field grade and purified TFM were tested.

90. DAWSON, V. K., J. B. SILLS, AND C. W. LUHNING. 1982. Accumulation and loss of 2',5-dichloro-4'-nitrosalicylanilide (Bayer 73) by fish: laboratory studies. 5 pp.

Coho salmon (*Onchorynchus kisutch*), rainbow trout (*Salmo gairdneri*), channel catfish (*Ictalurus punctatus*), and largemouth bass (*Micropterus salmoides*) were exposed to Bayer 73. Concentration and persistence of the lampricide in muscle, plasma, and bile were measured.

91. BURRESS, R. M. 1982. Effects of synergized rotenone on nontarget organisms in ponds. 7 pp.

Synergized rotenone was applied to two shallow, 0.05-ha ponds. The effects on total numbers and diversity of benthic invertebrates, mortality of caged Asiatic clams (*Corbicula manilensis*), and mortality of larval leopard frogs (*Rana pipiens*) were noted.

FWS/OBS

This section contains entries for all publications included in the Fish and Wildlife Service (FWS) series, "*FWS/OBS*," which was initiated in 1976 by the Office of Biological Services (OBS), hence the designation "*FWS/OBS*." Offices formerly in the OBS are now part of the Service's Region 8, Research and Development. In October 1984, the *FWS/OBS* series was replaced by the *Biological Report* series. This bibliography thus serves as a final record of the *FWS/OBS* series. Included are *FWS/OBS* series publications of the Eastern Energy and Land Use Team, the National Coastal Ecosystems Team, the Western Energy and Land Use Team, the National Power Plant Team, the Stream Alteration Team, and publications from several Regional Offices, and the OBS Washington office.

The *FWS/OBS* series was designed for the rapid publication of reports having an applications orientation. Reports in this series presented the results of applied research, technology development, and ecological surveys and inventories related to impacts of land and water development on fish and wildlife resources. Reports in the *FWS/OBS* series were designed primarily for use by FWS operational personnel, although the reports also were intended for use by other Federal and State agencies and the private sector involved in environmental impact assessment and other aspects of fish and wildlife resource management.

Entries are arranged by *FWS/OBS* number. The first two digits pertain to the year of publication or the year in which a subseries was initiated (see, for example, the 82/10 subseries). Basic bibliographic information and a brief annotation are included for each publication. In several instances a single annotation has been used to describe a group of similar publications or a subseries.

Some of the manuscripts assigned *FWS/OBS* series numbers have, for a variety of reasons, never been published. These unused numbers are indicated in the bibliography by *[Not issued]*.

76/01.1 BURKE, H. D. 1975. Wildlife and oil shale: a problem analysis and research program. Vol. 1. 100 pp.

This publication analyzes the probable consequences of oil shale development in Colorado, Utah, and Wyoming. Research about the natural and social environment of the Rocky Mountain oil shale region was reviewed. The "priority studies" are outlined and recommended, and suggestions for mitigation of undesirable impacts are given.

76/01.2 BURKE, H. D. 1975. Wildlife and oil shale: a problem analysis and research program. Vol. 2, appendix and bibliography. 131 pp.

This publication provides references for use with Vol. 1 (*FWS/OBS*-76/01.1).

76/02 OFFICE OF BIOLOGICAL SERVICES. 1975. Biological Services Program—fiscal year 1975. 52 pp.

The program operations and studies of the Office of Biological Services are discussed for fiscal year 1975. Projects include coal, oil shale, Western water allocation, geothermal energy, coastal ecosystems and outer continental shelf development, power plants, stream alterations, national wetlands inventory, biological indicators, and information transfer.

76/03 STALNAKER, C. B., AND J. L. ARNETT. 1976. Methodologies for the determination of stream resource flow requirements: an assessment. 199 pp.

A workshop on instream flows resulted in instream flow methodology developments in the areas of fisheries, wildlife, water quality, recreation, and aesthetics. Each area is described in a separate report section.

76/04 LORD, W. B., ET AL. 1975. Fish and wildlife implications of Upper Missouri Basin water allocation: a research assessment. 114 pp.

Research opportunities regarding energy development impacts on fish and wildlife resources in the Upper Missouri River Basin are evaluated with emphasis on water allocation changes. Recommendations for mitigating potential problems are included.

76/05 LYNCH, M. P., B. L. LAIRD, N. B. THEBERGE, AND J. C. JONES, EDITORS. 1976. An assessment of estuarine and nearshore marine environments. 132 pp.

An evaluation of the impacts of water uses and projected water demands upon the estuarine and nearshore marine environments of the United States. The evaluation includes a regional review of major estuarine and nearshore marine habitats, the economic value of the areas, the major problems impacting water and resources, and the management approach of the States.

76/06 LUND, J. A. 1976. Evaluation of channelization and mitigation of the fishery resources of the St. Regis River, Montana. 49 pp.

A study of stream morphology and game fish populations of the St. Regis River, Montana, to determine the effects of stream channelization caused by highway (Interstate 90 and U.S. 10) and railroad construction. In-stream structures used to mitigate fish losses are evaluated.

76/07 DODGE, W., E. E. POSSARDT, R. J. REED, AND W. P. MACCONNELL. 1976. Channelization assessment, White River, Vermont: remote sensing, benthos, and wildlife. 73 pp.

A collection and analysis of data on the amount of different types of fish and wildlife habitats along the White River; the amount and type of habitat altered in the 1973 flood disaster clean-up operation; and the effects of this habitat loss on fish, benthos, songbirds, amphibians, mammals, and reptiles.

76/08 ARNER, D. H., H. R. ROBINETTE, J. E. FRASIER, AND M. H. GRAY. 1976. Effects of channelization of the Luxapalila River on fish, aquatic, invertebrates, water quality, and furbearers. 59 pp.

An analysis of biological data collected from an old channelized segment, an unchannelized segment, and a newly channelized segment of the Luxapalila River in Mississippi and Alabama. Productivity of the old channelized segment of the river has not recovered to the levels exhibited in the unchannelized segment.

76/09 SATHER, J. H., EDITOR. 1976. Proceedings of the national wetland classification and inventory workshop. 358 pp.

A review of the current status of wetland work being conducted by various governmental and private agencies. The "Interim Classification of Wetlands and Aquatic Habitats of the United States" is appended to the proceedings and incorporates many suggestions that emanated from the workshop.

76/10 COCHRAN, A. 1975. A selected annotated bibliography on fish and wildlife implications of Missouri water allocation. 71 pp.

Contains references useful to those dealing with the management of water allocation within the Upper Missouri River Basin. The subject matter encompasses biological sciences, engineering, geology, law, and the social sciences.

76/11 BULKLEY, R. V. 1975. A study of the effects of stream channelization and bank stabilization on warm water sport fish in Iowa: subproject no. 1. Inventory of major stream alterations in Iowa. 338 pp.

Aerial photographs and public records were used in this study to determine the amount of channelization of Iowa streams with drainage areas greater than 50 mi^2. The extent of channelization was determined by measuring stream sinuosity. It is estimated that from 1,000 to 3,000 mi of streams have been lost in Iowa since settlers first arrived.

76/12 BULKLEY, A. L. 1975. A study of the effects of stream channelization and bank stabilization on warm water sport fish in Iowa: subproject no. 2. A study of the impact of selected bank stabilization structures on game fish and associated organisms. 116 pp.

A study of four types of bank stabilization structures, installed mainly for highway protection, to determine their impact upon game fish habitat in Iowa streams.

76/13 KING, L. R., AND K. D. CARLANDER. 1976. A study of the effects of stream channelization and bank stabilization on warm water sport fish in Iowa: subproject no. 3. Organisms in central Iowa warm water streams. 217 pp.

A study of six central Iowa streams to determine whether fish and fish food organisms were affected by short-reach channelization associated with bridge replacement in the last 15 years.

76/14 ZIMMER, D. W., AND R. W. BACHMANN. 1976. A study of the effects of stream channelization and bank stabilization of warm water sport fish in Iowa: subproject no. 4. The effects of long-reach channelization on habitat and invertebrate drift in some Iowa streams. 87 pp.

A study of the relationships between channel morphometry, habitat diversity, and invertebrate density in 11 natural and channelized stream segments of the upper Des Moines River Basin. The most obvious effect of channelization on stream habitat was a reduction in the diversity of water depth and current velocity.

76/15 MENZEL, B. W., AND H. L. FIERSTINE. 1976. A study of the effects of stream channelization and bank stabilization on warm water sport fish in Iowa: subproject no. 5. Effects of long-reach stream channelization on distribution and abundance of fishes. 108 pp.

A study of the relationships between habitat characteristics and the distribution and abundance of fishes in 11 natural and channelized warmwater stream segments of the upper Des Moines River. Species diversity was generally greatest in unchannelized woodland stream segments.

76/16 BULKLEY, R. V., ET AL. 1976. Warm water stream alteration in Iowa: extent, effects on habitat, fish, and fish food, and evaluation of stream improvement structures (summary report). 39 pp.

A summary of the results in five other subproject reports (*FWS/OBS*-76/11 to 76/15). Studies were conducted from 1973 to 1976 to determine the extent of stream channelization in Iowa, differences in populations of fish and fish food organisms in channelized and unchannelized streams, effects of stream alterations for highway bridge construction, and the value of stream-bank stabilization structures to fish habitat.

76/17 OFFICE OF BIOLOGICAL SERVICES. 1976. Coal project: five-year framework (FY 1976 through FY 1980). 44 pp.

This report presents the scope of the framework for the coal project over the next 5 years. The project's purpose is to provide the expertise and necessary information to allow for effective involvement of the U.S. Fish and Wildlife Service in national coal development actions.

76/18 OFFICE OF BIOLOGICAL SERVICES. 1976. Coal project: background information (planning and management). 40 pp.

This report presents summary information on coal development in the United States and material on the potential interactions of that development with fish and wildlife resources. Coverage is provided on the recently initiated Federal Coal Leasing Program and a discussion of biogeographic considerations is included.

76/19 OFFICE OF BIOLOGICAL SERVICES. 1976. Coal project: executive summary (coal project 5-year framework). 8 pp.

An overview of the entire Coal Project written in nontechnical terms.

76/20.1 to 76/20.9 OFFICE OF BIOLOGICAL SERVICES. A series of summaries on topics related to electric power generation and transmission and their effects on fish and wildlife resources.

76/20.1 BOREMAN, J. 1977. Impacts of power plant intake velocities on fish. 10 pp.

An outline of biological problems associated with power plant intake velocities. This brief includes information needed to assess impacts of intake velocities on fishery resources and a list of technical references containing more detailed analyses of the problems and mitigation alternatives.

76/20.2 ARNER, D. H. 1977. Transmission line rights-of-way management. 12 pp.

A summary of some current transmission line rights-of-way management practices and their costs, the bases for selecting a specific management technique, and some possible management goals to benefit fish and wildlife in various local situations.

76/20.3 GOODYEAR, C. P. 1977. Mathematical methods to evaluate entrainment of aquatic organisms by power plants. 17 pp.

This brief contains equations which may be used to estimate the percentage loss of populations of aquatic organisms that are entrained by power plants located on rivers and streams, lakes and reservoirs, and estuaries.

76/20.4 [Not issued]

76/20.5 FRITZ, E. S. 1978. Federal Water Pollution Control Act: the sections 316(a) and (b) process. 13 pp.

Sections 316(a) and (b) of the Federal Water Pollution Control Act deal with thermal (heat) discharges and cooling water intake structures. This publication explains the procedures that must be followed to adhere to these sections.

76/20.6 SUTER, G. W., II. 1978. Effects of geothermal energy development on fish and wildlife. Topical briefs no. 6. 20 pp.

This project discusses the nature of geothermal resources, technologies for exploration, extraction, and use; effects of these activities on fish and wildlife; and the potential for habitat enhancement. Emphasis is placed on the range of possible activities and effluents, including comparisons with other energy technologies.

76/20.7 BOWLES, R. R., J. V. MERRINER, AND J. BOREMAN. 1978. Factors affecting accuracy of ichthyoplankton samples used in power plant entrainment studies. 12 pp.

Sampling programs designed to assess impact of power plants on ichthyoplankton populations are subject to multiple sources of error that may affect reliability and applicability of the data. Gear currently used to sample ichthyoplankton are discussed, and abiotic and biotic factors that may prevent these gear from attaining "representative" samples are identified. A checklist of items which should be considered in evaluation of existing or proposed programs to sample ichthyoplankton is provided.

76/20.8 AVERY, M., AND R. K. SCHREIBER. 1979. The Clean Air Act: its relation to fish and wildlife resources. 14 pp.

Federal air quality legislation is reviewed, with special emphasis on th 1977 Amendments to the Clean Air Act, particularly those aspects concerning fish and wildlife resources. Participation by fish and wildlife biologists in the implementation of the 1977 Amendments is discussed, and future research needs are identified.

76/20.9 FRITZ, E. S. 1980. Cooling water intake screening devices used to reduce entrainment and impingement. 21 pp.

Cooling water intake screening devices are identified and described. For each device, the location, limitations or restrictions, evidence for reducing entrainment and impingement, and major unresolved problems are also discussed.

76/21 WOODWARD-CLYDE CONSULTANTS. 1976. Preliminary report: gravel removal studies in selected arctic and subarctic streams in Alaska. 127 pp.

An evaluation of the effects of gravel removal in streams. Guidelines are included to help resource managers formulate recommendations to minimize environmental impact from operations involving the removal of gravel from streams and floodplains. (*See also FWS/OBS*-80/08 and 80/09.)

76/22 GULF SOUTH RESEARCH INSTITUTE. 1977. Impact of mosquito control practices: a bibliography. 97 pp.

An annotated bibliography with sections on insecticide studies and environmental controls.

76/23 BOREMAN, J., EDITOR. 1976. Great Lakes fish egg and larvae identification. 220 pp.

The proceedings of a workshop held April 19–21, 1976, in Ann Arbor, Michigan, to (1) assess the state-of-the-art of Great Lakes fish egg and larvae identification and (2) develop a strategy for future taxonomic work in the Great Lakes region. Included with the proceedings are an annotated bibliography, a fish species list for each of the Great Lakes, and a list of family characteristics of the fish larvae.

76/24 HEADRICK, M. R. 1976. Effects of stream channelization on fish populations in the Buena Vista Marsh, Portage County, Wisconsin. 38 pp.

This study was part of an investigation of channelization impacts on fishery, aquatic invertebrate, and wildlife resources in the central Wisconsin sand plain. Recently dredged ditches were investigated to determine immediate effects; old ditches were investigated to determine how well fish populations had recovered 52–62 years after dredging.

76/25 PRELLWITZ, D. M. 1976. Effects of stream channelization of terrestrial wildlife and their habitats in Buena Vista Marsh, Wisconsin. 64 pp.

This study was part of an investigation of channelization impacts on fishery, aquatic invertebrate, and wildlife resources in the central Wisconsin sand plain. Stream channelization affected wildlife in the Buena Vista Marsh by draining wetlands, setting back plant succession and decreasing habitat diversity along stream banks.

76/26 [Not issued]

76/27 OFFICE OF BIOLOGICAL SERVICES. 1975. Workshop on environmental/ecological mapping needs of the U.S. Fish and Wildlife Service. 37 pp.

This summarizes a workshop held 31 August to 2 September 1976 in Monterey, California, to develop internal and external mapping procedures fulfilling the needs of the Fish and Wildlife Service.

76/28 NELSON, W., ET AL. 1976. Assessment of effects of altered stream flow characteristics on fish and wildlife, Part A: Rocky Mountains and Pacific Northwest. 14 pp.

The report *FWS/OBS*-76/29 is summarized here, and recommendations for improving the process of instream flow reservation and implementation are discussed.

76/29 to 76/34 This series of publications deals with flow conditions below 142 dams and diversions in the Rocky Mountains, the Pacific Northwest,

and California. Findings, analysis, conclusions, and recommendations are included regarding changed flow regimes below dams, impacts on fisheries, and methodologies used to assess flow requirements.

76/29 NELSON, W. ET AL. 1976. Assessment of effects of altered stream flow characteristics on fish and wildlife, Part A: Rocky Mountains and Pacific Northwest, final report. 120 pp.

76/30 NELSON, W. ET AL. 1976. Assessment of effects of altered stream flow characteristics on fish and wildlife, Part A: Rocky Mountain region case studies. 373 pp.

76/31 NELSON, W. ET AL. 1976. Assessment of effects of altered stream flow characteristics on fish and wildlife, Part A: Pacific Northwest region case studies. 398 pp.

76/32 HAZEL, C. 1976. Assessment of effects of altered stream flow characteristics on fish and wildlife, Part B: California, executive summary. 20 pp.

76/33 HAZEL, C. 1976. Assessment of effects of altered stream flow characteristics on fish and wildlife, Part B: California, final report. 65 pp.

76/34 HAZEL, C. 1976. Assessment of effects of altered stream flow characteristics on fish and wildlife, Part B: California case studies. 611 pp.

76/35 GILES, R. H., JR., A. B. JONES III, AND C. W. SMART. 1976. Power: a computer system for corridor location. 30 pp.

Description of a computerized technique for power line corridor selection. Environmental impact is heavily stressed in the system as well as other aspects of corridor location such as maintenance and cost to rate payers.

76/36 SPAULDING, B. 1976. Geothermal handbook. 194 pp.

This report, intended as a working tool for the field, discusses the basic geologic, physical, and chemical characteristics of geothermal resources; the probable locations of future developments in the West; environmental assessment procedures; and means of wildlife compensation and habitat improvements.

76/37 ANDERSON, D. R. 1976. Guidelines for line transect sampling of biological populations. 28 pp.

This publication, directed at field biologists and biological technicians, provides guidelines for designing and conducting field surveys to estimate the size or density of biological populations using the line transect sampling method.

77/01 TOWNSEND, J. E., AND R. J. SMITH, EDITORS. 1977. Improving fish and wildlife benefits in range management: proceedings of a seminar held in conjunction with the 41st North American Wildlife and Natural Resource Conference, March 20, 1976. Washington, DC. 118 pp.

An examination of traditional range management practices and the resulting conflicts with wildlife needs. Suggested solutions are given for some specific range management problems. The proceedings consist of papers presented at the seminar, panel discussions, question and answer period transcripts, and conclusions reached by the participants.

77/02 SCHARF, W. C., M. L. CHAMBERLAIN, T. C. ERDMAN, G. W. SHUGART, L. SHANKS, AND M. LANDIN. 1979. Nesting and migration areas of birds of the U.S. Great Lakes. 360 pp.

This 2-year study evaluated the current status of migratory and colonial-nesting species in the Great Lakes. Population estimates, approximate nesting dates, vegetation associations, and substrates for 207 nesting sites are presented. In addition, 75 migration areas are listed, and their significance to avian populations is discussed.

77/03 GULF SOUTH RESEARCH INSTITUTE. 1977. Coastal marsh productivity: a bibliography. 315 pp.

The bibliography consists of 401 references with abstracts covering the productivity of U.S. coastal marshes. Included are sections on the marsh environment, primary productivity of marsh plants, detritus in the food chain, marsh estuaries as fish havens, and the marsh as a habitat and feeding ground.

77/04 GRAVES, F. M. 1977. Energy, public choices, and environmental data needs. 61 pp.

This publication outlines the decisionmaking process of several Federal and State agencies relative to energy developments and fish and wildlife resources in coal and oil shale areas of the West.

77/05 ELLIS, S. L. 1977. Guide to land cover and use classification systems employed by western governmental agencies. 184 pp.

This publication surveys 75 systems presently in use by Federal and State agencies in 16 western States and 2 provinces of Canada.

The focus is on systems classifying wildlife, land use, and terrestrial vegetation.

77/06 WILSON, W. J., E. H. BUCK, G. F. PLAYER, AND L. D. DREYER. 1977. Winter water availability and use conflicts as related to fish and wildlife in arctic Alaska: a synthesis of information. 221 pp.

A consolidation of available information related to fish overwintering, wildlife use of unfrozen water during winter, and winter water conditions. This report describes development activities that require water in winter, summarizes existing regulations and agency responsibilities governing water use, and assesses current and future winter water conflicts between man and fish or wildlife.

77/07 PORTNOY, J. W. 1977. Nesting colonies of seabirds and wading birds: coastal Louisiana, Mississippi, and Alabama. 126 pp.

Nesting colonies along the northern Gulf of Mexico were studied to estimate abundance by species at each colony and to document nesting chronology for each species. This information can be used as a biotic indicator of the stability of the coastal ecosystem.

77/08 OSBORN, R. G., AND T. W. CUSTER. 1978. Herons and their allies: atlas of Atlantic coast colonies, 1975 and 1976. 211 pp.

Data are presented on 291 heron colonies along the Atlantic Coast from Maine to Florida in 1976 and 1976. Also included are regional and individual maps of colonies, nesting population estimates, and breeding activities by species, and information about the geography, habitats, and human use of each area. These data are from the first comprehensive survey of heron colonies along the Atlantic Coast, and may be valuable in assessing ecological changes in the coastal zones.

77/09 RALSTON, S., ET AL. 1977. The ecological effects of coal strip-mining: a bibliography with abstracts. 416 pp.

This bibliography contains annotated entries on the ecological effects of coal strip-mining in the West, especially the Northern Great Plains. Part I contains citations and abstracts. Part II is an extensive "Key Word in Title" index.

77/10 THORNE ECOLOGICAL INSTITUTE. 1977. Directory of existing natural resource agency manuals and handbooks. 61 pp.

Superseded by *FWS/OBS*-78/22.

77/11 OFFICE OF BIOLOGICAL SERVICES. 1977. Publications of the Biological Services program.

77/12 to 77/15 This series of reports was developed to assist FWS personnel in evaluating the impacts of offshore oil and gas activities on coastal resources.

77/12 CLARK, J., J. ZINN, AND C. TERRELL. 1978. Environmental planning for offshore oil and gas. Vol. 1, recovery technology. 226 pp.

Reviews oil and gas resources on the national scale, describes the recovery process and the major activities and facilities related to OCS operations.

77/13 ZINN, J. 1978. Environmental planning for offshore oil and gas: Vol. II, effects on coastal communities. 60 pp.

Discusses the economic and environmental effects of the growth of coastal communities.

77/14 CLARK, J., AND C. TERRELL. 1978. Environmental planning for offshore oil and gas. Vol. III, effects on living resources and habitats. 220 pp.

Provides a comprehensive review of sources of ecological disturbance from OCS-related primary and secondary development.

77/15 BANTA, J. S. 1978. Environmental planning for offshore oil and gas. Vol. IV, regulatory framework for protecting living resources. 126 pp.

An analysis of the regulatory framework related to OCS activities and describes the laws and policy-controlling inshore and onshore support activities.

77/16.1 to 77/16.5 This series of five reports focuses on current and anticipated OCS development in each of five coastal regions of the United States: New England; Mid and South Atlantic; Gulf; California; and Alaska, Washington, and Oregon.

77/16.1 TIPPIE, V., AND D. ROBADUE. 1978. Environmental planning for offshore oil and gas. Vol. V, regional status reports. Part 1, New England. 67 pp.

77/16.2 GOODMAN, J. 1978. Environmental planning for offshore oil and gas. Vol. V, regional status reports. Part 2, mid and south Atlantic. 93 pp.

77/16.3 MUMPHREY, A. J., AND G. D. GARLUCCI. 1978. Environmental planning for offshore oil and gas. Vol. V, regional status reports. Part 3, Gulf Coast. 158 pp.

77/16.4 CORWIN, R., AND P. H. HEFFERNAN. 1978. Environmental planning for offshore oil and gas. Vol. V, regional status reports. Part 4, California. 154 pp.

77/16.5 HERSHMAN, M. J., AND J. H. FELDMAN. 1978. Environmental planning for offshore oil and gas. Vol. V, regional status reports. Part 5, Alaska, Washington, and Oregon. 127 pp.

77/17 [Not issued]

77/18 [Not issued]

77/19 LAMB, B. L. 1977. Guidelines for preparing expert testimony in water management decisions related to instream flow issues. IFIP No. 1. 42 pp.

Superseded by *FWS/OBS*-79/37.

77/20 MOORE, R. 1977. An environmental guide to western surface mining. Part 1: Federal leasable and locatable mineral regulations. 67 pp.

Contains a compilation of all Federal environmental regulations, as of 15 March 1977, pertaining to Western surface mining. Minerals covered by this study include coal, oil shale, copper, uranium, bentonite, phosphate, and gypsum. (Part II is *FWS/OBS*-78/04.)

77/21 SALMEN, L., ET AL. 1977. User needs assessment for an operational geographic information system. 89 pp.

This publication presents the results of a 5-month survey of user needs for a geographic information system. The assessment focuses on three groups of users: Denver Region 6 FWS Offices; Region 6 Billings Area Office; and Special Projects of OBS.

77/22 SALMEN, L., ET AL. 1977. A general design schema for an operational geographic information system. 49 pp.

This report presents a general system design and outlines a basic set of system capabilities for the FWS's geographic information system.

77/23 OFFICE OF BIOLOGICAL SERVICES. 1977. Balancing national energy needs with ecological requirements: Eastern Energy and Land Use Task Force Report, executive summary. 34 pp.

A summary of the findings to date of the Eastern Energy and Land Use Task Force formed in October 1975. The Task Force has analyzed ongoing and anticipated energy and mineral developments in the eastern United States to determine the impact on fish, wildlife, and their habitat and recommended solutions.

77/24 FORE, P. L., EDITOR. 1977. Proceedings of the 1977 oil spill response workshop. 153 pp.

A collection of papers presented at the oil spill response workshop held in New Orleans, February 15–17, 1977. The workshop was co-sponsored by the Office of Migratory Bird Management and was designed to improve the Service's capability and effectiveness in responding to oil spills. Includes techniques for minimizing the biological impacts of oil on wildlife and a critique of the FWS oil spill contingency plan.

77/25 KALLEMEYN, L. W., AND J. F. NOVOTNY. 1977. Fish and fish food organisms in various habitats of the Missouri River in South Dakota, Nebraska, and Iowa. 100 pp.

This study was undertaken to assess the ecological value of various river habitats and to serve as a guide for engineering planners. Data were collected in the upper end of the channelized Missouri River to evaluate ecological effects of notching dikes and revetments. The report relates habitat characteristics to fish species, sizes and abundances, and to kinds and abundance of fish food.

77/26 DEWSNUP, R. L., ET AL. 1977. Strategies for reserving flows for fish and wildlife: identification, description, and preliminary evaluation. 706 pp.

This report contains an extensive overview of Federal laws, State laws, water quality laws, and interstate compacts as they relate to the provision of instream flows for fish and wildlife purposes.

77/27 DEWSNUP, R. L., ET AL. 1977. State laws and instream flows. 76 pp.

This publication examines water laws regarding instream flow reservations for 13 Western States. The report also identifies strategies available for reserving flows and presents in a matrix form the legal foundation for each strategy on a State-by-State basis.

77/28 DEWSNUP, R. L., AND D. W. JENSEN. 1977. Western interstate water compacts and instream flows. v.p.

Each of the interstate compacts regarding water allocation in the western States are identified and described in terms of their provisions, both general and for reserving flows for fish and wildlife.

77/29 DEWSNUP, R. L., ET AL. 1977. Promising strategies for reserving instream flows. 78 pp.

Summarizes the more important State and Federal water law concepts as they relate to reserving instream flows for fish and wildlife. More than 30 strategies for reserving instream flows within existing laws are described.

77/30 NELSON, W., ET AL. 1977. Habitat and population improvement measures accompanying water resource development projects. 39 pp.

This publication describes successful and potentially successful habitat and population improvement measures accompanying water resource development projects, especially dams and reservoirs in the West.

77/31 to 77/35 These bibliographies contain abstracts of literature pertaining to the flora, fauna, and physical characteristics of the WELUT Ecological Test Areas in Wyoming, Montana, North Dakota, New Mexico, Utah, and Colorado.

77/31 ECOLOGY CONSULTANTS, INC. 1977. Annotated bibliography of natural resource information: Powder River Basin, northeastern Wyoming/southeastern Montana. 234 pp.

77/32 ECOLOGY CONSULTANTS, INC. 1977. Annotated bibliography of natural resource information: southwestern North Dakota. 234 pp.

77/33 ECOLOGY CONSULTANTS, INC. 1977. Annotated bibliography of natural resource information: northwestern New Mexico. 150 pp.

77/34 ECOLOGY CONSULTANTS, INC. 1977. Annotated bibliography of natural resource information: southern Utah. 265 pp.

77/35 ECOLOGY CONSULTANTS, INC. 1977. Annotated bibliography of natural resource information: northwestern Colorado. 194 pp.

77/36 OFFICE OF BIOLOGICAL SERVICES. 1977. Cooperative Instream Flow Service Group: the first year. 8 pp.

The personnel, goals, and activities of the multiagency, multidiscipline Cooperative Instream Flow Service Group are described.

77/37 JOHNSON, J. B., AND L. A. BARCLAY, EDITORS. 1977. Contributed papers on coastal ecological characterization studies. Fourth Biennial International Estuarine Research Conference, Mount Pocono, Pennsylvania, October 2–5, 1977. Published June 1978. 66 pp.

77/38 to 77/41 These four publications pertain to the Plant Information Network (PIN). *See also FWS/OBS*-83/36.

77/38 VORIES, K. C., ET AL. 1977. The Plant Information Network: Vol. I, a user's guide. 73 pp.

This handbook describes the basic philosophy of the Plant Information Network, its organization, the descriptors included, and definitions used for descriptors. Basic language used to query the database is also included.

77/39 VORIES, K., ET AL. 1977. The Plant Information Network. Vol. II, reclamation and PIN in northwestern Colorado. 62 pp.

This publication is a guide to the use of PIN for information on environmental inventory, endangered plant status, and reclamation. Sample queries are included.

77/40 VORIES, K., ET AL. 1977. The Plant Information Network. Vol. III, reclamation and PIN in the Powder River Basin of Montana and Wyoming. 59 pp.

This publication is a guide to the use of PIN for information on environmental inventory, endangered plant status, and reclamation. Sample queries are included.

77/41 VORIES, K., ET AL. 1977. The Plant Information Network. Vol. IV, a subject guide and annotated bibliography of selected literature on land reclamation in western United States. 75 pp.

This publication presents a subject guide and annotated bibliography of selected publications pertaining to land reclamation and rehabilitation in the West.

77/42 KEENLYNE, K. D. 1977. Tactical approach for determining impact of energy development on wildlife in Wyoming (Spec. Rep. 1). 16 pp.

This report explains the tactical duties of the Wyoming Coal Coordinator and the rationale to be followed in performing these duties. Includes a discussion on assessing impacts on wildlife and an outline for a series of reports from the Coal Coordinator summarizing existing information and identifying potential problem areas.

77/43 KEENLYNE, K. D. 1977. Coal (Spec. Rep. 2). 40 pp.

Identifies possible areas of concern for wildlife and its habitat in Wyoming with the development of coal resources and associated land use changes. Summarizes past and present development of coal resources in Wyoming in anticipation of future data needs for making resource decisions in coal development.

77/44 KEENLYNE, K. D. 1977. Endangered or threatened species in Wyoming (Spec. Rep. 3). 48 pp.

An overview of the potential impact of energy development in Wyoming on Federally listed "endangered" and "threatened" species. Identifies areas where biological information necessary to assess the effects of future development may be inadequate or lacking.

77/45 [Not issued]

77/46 GRISWOLD, B. L., C. EDWARDS, L. WOODS, AND E. WEBER. 1978. Some effects of stream channelization on fish populations, macroinvertebrates, and fishing in Ohio and Indiana. 64 pp.

The effects of stream channelization were studied in five streams by comparing the biota in natural areas to that in nearby channelized areas. Study streams were the Olentangy, Sandusky, Hocking, and Little Auglaize Rivers in Ohio, and Rock Creek in northeast Indiana. An additional channelized study site which had large artificial riffle-pool stream improvement structures was studied in the Olentangy.

77/47 LAMB, B. L. 1977. Protecting instream flows under western water laws: selected papers. IFIP No. 2. 65 pp.

This publication contains papers submitted to a 1977 panel, "Protection of Instream Flow Under Western Water Law." A matrix of strategies for protecting instream flows under existing water law is included.

77/48 TERRELL, T. T. 1977. Interim hierarchical regional classification scheme for coastal ecosystems of the United States and its territories. 40 pp.

This is a review of the literature on coastal ecosystem classifications. A hierarchical classification scheme is presented to be used in predicting the impact of various perturbations on coastal ecosystems. Superseded by *FWS/OBS*-78/80.

77/49 NELSON, W., ET AL. 1976. Unobligated and unutilized reservoir storage at Federal controlled dams. 59 pp.

This report identifies the status and amounts of unobligated and unutilized storage space in operating Federal reservoirs in the West. It also identifies legislative and administrative means for making these supplies of stored water available for fish and wildlife purposes.

77/50 OFFICE OF BIOLOGICAL SERVICES. 1977. Biological Services Program, fiscal year 1976. 90 pp.

Overview of the organization and 1976 fiscal year activities of the Biological Services Program of the Fish and Wildlife Service.

77/51 MULVIHILL, E. L., C. A. FRANCISCO, J. B. GLAD, K. B. KASTER, AND R. E. WILSON. 1980. Biological impacts of minor shoreline structures on the coastal environment: state-of-the-art review. Vol. I, 156 pp. Vol. II, 306 pp.

This review summarizes and evaluates the information found in the literature for minor shoreline structures: breakwaters, jetties, groynes, bulkheads, revetments, ramps, piers and other support structures, buoys and floating platforms, harbors for small craft, bridges, and causeways. The information is intended for fish and wildlife biologists who review permits for the construction of minor shoreline structures in the coastal environment. Vol. II contains an annotated bibliography, keyword index, and primary author reference number index.

77/52 OAK RIDGE ASSOCIATED UNIVERSITIES. 1976. Environmental effects of energy. 31 pp.

This report contains the proceedings of a conference convened to review two segments of an EPA pass-through program: ecological effects and environmental transport processes. The purpose was to characterize ecological effects, the program's relationship to energy development, gaps in information, and relevance to management.

77/53 [Not issued]

77/54 SALMEN, L., ET AL. 1977. Comparison of selected operational capabilities of 54 geographic information systems. 30 pp.

This report presents an overview of 54 geographic information systems and their ability to meet the needs of Fish and Wildlife, Region 6, for a computer-based geographic information system. An appendix outlining functional criteria for software evaluation is included.

77/55 SALMEN, L., ET AL. 1977. Natural resource geographic data bases for Montana and Wyoming. 70 pp.

This report is the result of a survey of existing data bases for potential use by the FWS Region 6. Data bases surveyed consist mainly of spatially-oriented data that would be useful in a geographic information system for Montana and Wyoming.

77/56 GULF SOUTH RESEARCH INSTITUTE. 1978. Barrier islands of the Atlantic and Gulf Coasts of the United States: an annotated bibliography. 215 pp.

Selected publications on the living resources for fish and wildlife habitats of the Barrier Islands of the Atlantic and Gulf Coasts. Includes subject and author indexes.

77/57 JOHNSON, P. L., EDITOR. 1977. An ecosystem paradigm for ecology. 20 pp.

The results of a workshop organized by Oak Ridge Associated Universities and the Institute of Ecology. Collective views of the participants are presented on the nature of ecosystem ecology as a science. The workshop was supported by the Rockefeller Foundation and the Office of Biological Services, U.S. Fish and Wildlife Service.

77/58 to 77/60, 78/87 to 78/89, 78/93, 78/94 The series Impact of Water Level Changes on Woody Riparian and Wetland Communities provides a current summary of information concerning the effect of water level imposed stress on a wide range of woody plants. The series is divided into volumes separating regions by dominant forest types. This is intended to facilitate usage on the regional or local level. The first volume describes physiological, morphological, and community changes which occur as a result of inundation of wetland ecosystems. Other volumes in the series provide a summary of regional wetland ecosystems, dominant and associated species types and a review of individual species tolerance to inundation.

77/58 TESKEY, R. O., AND T. M. HINCKLEY. 1977. Impact of water level changes on woody riparian and wetland communities. Vol. I, plant and soil responses. 30 pp.

77/59 TESKEY, R. O., AND T. M. HINCKLEY. 1977. Impact of water level changes on woody riparian and wetland communities. Vol. II, the southern forest region. 46 pp.

77/60 TESKEY, R. O., AND T. M. HINCKLEY. 1977. Impact of water level changes on woody riparian and wetland communities. Vol. III, the central forest region. 36 pp.

77/61 JOSEPH, T., ET AL. 1977. An indexed, annotated bibliography of the endangered and threatened fishes of the Upper Colorado River system. 169 pp.

This bibliography emphasizes the limiting factors, habitat alteration, and numerous environmental characteristics associated with the endangered and threatened fishes of the Upper Colorado River system. Subject, geographic, and systematic indexes are included.

77/62 JOSEPH, T., AND J. A. SINNING. 1977. An evaluation of the status, life history, and habitat requirements of endangered and threatened fishes of the Upper Colorado River system. 183 pp.

This report focuses on endangered and threatened fishes and their ecosystems. The major sections of the report are abiotic components, biological components, species description, river basin description, major factors inducing environmental change, and recommended research priorities.

77/63 BOVEE, K. D., ET AL. 1977. Development and evaluation of weighted criteria, probability-of-use curves for instream flow assessment: fisheries. IFIP No. 3. 53 pp.

This report describes methods and procedures for probability criteria curves. Weighted criteria are used to assess impacts of altered streamflow regimes on a stream habitat, using parameters of depth, velocity, substrate, and temperature. Guidelines for data collection, analysis, and curve development are discussed.

77/64 CUSTER, T. W., AND R. G. OSBORN. 1977. Wading birds as biological indicators: 1975 colony survey. *Spec. Sci. Rep.—Wild.* 206. 28 pp.

Study of suitability of wading birds (herons and their allies) as biological indicators in the coastal environment. Eight teams of investigators located and censused 198 colonies along the Atlantic coast from Maine to Florida. Fourteen species, including more than 0.25 million breeding birds, were censused.

77/65 HOLDER, P. D. 1977. Habitat requirements of juvenile Colorado River squawfish. 71 pp.

This study determines the habitat requirements of several rare fishes, primarily young Colorado squawfish (*Ptychochcilos lucius*). The objectives of the study were to determine the physical and chemical parameters of the fish habitats, determine where spawning occurs, determine movements of size classes of rare fishes, determine the fish species associated with the study area, and assess the relative importance of various river habitats.

77/66 LEEDY, D. L., R. M. MAESTRO, AND T. M. FRANKLIN. 1978. Planning for wildlife in cities and suburbs. 64 pp.

A manual which identifies and relates principles of wildlife and urban planning. Suggestions are made for improving cooperation among planners, developers, and biologists. The study was co-sponsored by the American Society of Planning Officials, Chicago, Illinois.

78/01 BLOOM, S. G., B. W. CORNABY, AND W. E. MARTIN. 1978. A guide to mathematical models used in steam electric power plant environmental impact assessment. 153 pp.

The guide provides a nontechnical overview of modeling approaches for predicting and assessing environmental impacts of steam electric power plant operation on fish and wildlife resources.

78/02 OFFICE OF BIOLOGICAL SERVICES. 1978. The Plant Information Network brochure. 2 pp.

This brochure describes the organization, philosophy, and statement of need for the Plant Information Network (PIN). A list of PIN descriptors and descriptor states and examples of the use of PIN are included.

78/03 [Not issued]

78/04 MOORE, R., AND T. MILLS. 1977. An environmental guide to western surface mining. Part Two: impacts, mitigation, and monitoring. 384 pp.

This guide assembles information about the effects of surface mining in the Northern Great Plains, the Rocky Mountains, and the Southwest on fish and wildlife and recommends ways to mitigate these effects. (Part One is *FWS/OBS*-77/20.)

78/05 [Not issued]

78/06 [Not issued]

78/07 BOVEE, K. D. 1978. Probability of use criteria for the family Salmonidae. IFIP No. 4. 90 pp.

This report gives the probability of use criteria for the hydraulic parameters of depth, velocity, substrate, and temperature for the family Salmonidae.

78/08 OFFICE OF BIOLOGICAL SERVICES. 1979. The Chenier Plain ecological characterization. Brochure.

A brochure describing "An Ecological Characterization Study of the Chenier Plain Ecosystem of Louisiana and Texas" (*FWS/OBS*-78/09 to 78/11). Summarizes habitats and human activities of this region.

78/09 to 78/11 This three-volume series is a compilation of existing information about the biological, physical, and social characteristics of the Chenier Plain of Louisiana and Texas. The information is intended for use in coastal planning and management.

78/09 GOSSELINK, J. G., C. L. CORDES, AND J. W. PARSONS. 1979. An ecological characterization study of the Chenier Plain coastal ecosystem of Louisiana and Texas. Vol. I, narrative report. 325 pp.

78/10 GOSSELINK, J. G., C. L. CORDES, AND J. W. PARSONS. 1979. An ecological characterization study of the Chenier Plain coastal ecosystem of Louisiana and Texas. Vol. II, appendixes. 419 pp.

78/11 GOSSELINK, J. G., C. L. CORDES, AND J. W. PARSONS. 1979. An ecological characterization study of the Chenier Plain coastal ecosystem of Louisiana and Texas. Vol. III, atlas. 11 maps.

78/12 JONES, P. W., ET AL. 1978. Development of fishes of the mid-Atlantic bight: an atlas of egg, larval, and juvenile stages.

Vol. I: Acipenseridae through Ictaluridae. 366 pp.
Vol. II: Anguilliade through Syngnathidae. 458 pp.
Vol. III: Aphredoderidae through Rachycentridae. 394 pp.
Vol. IV: Carangidae through Ephippidae. 314 pp.
Vol. V: Chaetodontidae through Ophidiidae. 340 pp.
Vol. VI: Stromateidae through Ogcocephalidae. 416 pp.

A six-volume series of reference books which compiles descriptions of the egg, larval, and juvenile stages of more than 300 fish species, and includes dichotomous keys useful for identifying species. Descriptions of spawning migrations and life habits of adult fishes, their geographic range and distribution, and movements of fish at all life stages are also included. The text for each species is accompanied with selected illustrations of the various life history stages from worldwide literature. Each volume ends with a single bibliography for all the species included.

78/13 JOSEPH, T. 1977. An indexed annotated bibliography of the rare fishes of the Upper Missouri River system. 282 pp.

This bibliography is Part One of a two-part study of the status, life history, and habitat requirements of rare fishes with restricted distributions in the Upper Missouri River system. Part Two is presented in *FWS/OBS*-78/32.

78/14 MARZOLF, G. R. 1978. The potential effects of clearing and snagging on stream ecosystems. 31 pp.

This report contains a literature review of stream ecology and assessments of some of the ecological impacts of clearing and snagging. It describes parameters for quantitatively evaluating the ecological effects of specific clearing and snagging projects.

78/15 SCHARF, W. C. 1978. Colonial birds nesting on man-made and natural sites in the U.S. Great Lakes. 189 pp.

Habitats and nesting populations of colonial nesting birds of the U.S. Great Lakes were determined by aerial census, ground nest observations, and vegetation analysis during 1976 and 1977. Thirteen species at 267 colonies were found during this 2-year study. An atlas of nesting sites and populations for both years of the study locates and gives the sizes of the colonies.

78/16 TIMBOL, A. S., AND J. A. MACIOLEU. 1978. Stream channel modification in Hawaii. Part A: statewide inventory of streams, habitat factors, and associated biota. 171 pp.

A statewide, exhaustive inventory of perennial streams with channel modifications, including a general survey of habitat factors and macrofauna (fish and decapod crustaceans).

78/17 NORTON, A. S., A. S. TIMBOL, AND J. D. PARRISH. 1978. Stream channel modification in Hawaii. Part B: effect of channelization on the distribution and abundance of fauna in selected streams. 47 pp.

Effects of channelization on native Hawaiian stream fauna were assessed by making physiochemical measurements and analyzing and comparing macrofaunal communities (fish and crustaceans) in channelized and unchannelized streams. Results of this study are relevant to many tropical oceanic high islands.

78/18 HATHAWAY, C. B., JR. 1978. Stream channel modification in Hawaii. Part C: tolerance of native stream species to observed levels of environmental variability. 59 pp.

Provides a detailed description of stream conditions that are important to native species, and how channelization affects those conditions. It also reports levels of tolerance of several native species to altered stream characteristics.

78/19 PARRISH, J. D., ET AL. 1978. Stream channel modification in Hawaii. Part D: summary report. 18 pp.

A general summary of a 3-year statewide study of the occurrence and consequences of channelization in Hawaiian streams. An inventory of 366 perennial streams included information on physical characteristics, complete status of channel alteration, and macrofaunal communities. Recommendations for mitigating the impact of channel modification are included.

78/20 EVANS, K., ET AL. 1978. Atlas of western surface-mined lands: coal, uranium, and phosphate. 373 pp.

This is a compilation of information on mines in 11 contiguous Western States which were operating prior to 1976 and are more than 10 acres. Location, owner/operator, mining plans and methodology, reclamation plans, dates of operation, and current land conditions are included.

78/21 STATES, J. B., ET AL. 1978. A systems approach to ecological baseline studies. 400 pp.

This handbook is intended to help baseline study project managers and their technical staffs analyze ecosystems threatened by impacts and requiring baseline studies for environmental impact statements, post-impact monitoring programs, and reclamation plans.

78/22 BURKE, H. D. 1978. Bibliography of manuals and handbooks from natural resource agencies. 79 pp.

This bibliography supersedes *FWS/OBS*-77/10. It lists handbooks and manuals relating to wildlife (produced by State and Federal agencies) which are not found in libraries or information retrieval systems. The revised edition includes an agency and subject index, in addition to an expanded introductory chapter.

78/23 MCCONNELL, W. G., ET AL. 1978. Stream classification 1977: proceedings of a workshop held at Pingree Park, Colorado, October 10–13, 1977. 70 pp.

This workshop was designed to provide an outline for the accurate development of useful stream classifications. The three major points considered were the purposes of classification, the principles necessary to

ensure the usefulness of a classification, and the processes of developing and sequencing components in a useful classification.

78/24 [Not issued]

78/25 NELSON, W. R., ET AL. 1978. Reservoir ecosystems and western coal development in the Upper Missouri River. 12 pp.

This report provides an overview of a 1-year FWS study which evaluated the limnology, water chemistry, and fisheries of Lake Fort Peck in Montana and Lake Sakakawea in North Dakota. Descriptions of their baseline conditions, impacts of coal developments, mitigation measures, and further research needs are described.

78/26 CLOUD, T. 1978. Texas lignite: environmental planning opportunities. 12 pp.

This report discusses the impacts of Texas lignite development on aquatic and terrestrial environments and recreation. Various opportunities for environmental protection measures, such as involving concerned agencies and the public in planning and the establishment of reclamation plans are also discussed.

78/27 [Not issued]

78/28 [Not issued]

78/29 DVORAK, A. J., ET AL. 1978. Impacts of coal-fired power plants on fish, wildlife, and their habitats. 261 pp.

This report contains an assessment of expected impacts to terrestrial and aquatic biota and their habitats that are associated with the operation of coal-fired power stations, from the point at which coal is delivered to the site through disposal of process wastes. Emphasis is placed on discussion of impacts unique to coal combustion, although some features of gas- and oil-fired stations are also addressed. Impacts arising from thermal effluents, condenser cooling facilities, and power transmission are not discussed.

78/30 MASON, W. T., JR., EDITOR. 1978. Methods for the assessment and prediction of mineral mining impacts on aquatic communities: a review and analysis. Workshop proceedings. 157 pp.

State-of-the-art overviews on methods for the collection and analysis of aquatic biological samples and on interpretive data techniques. Recommendations are given on the advantages and disadvantages of selected methods. Discussions on the status of predictive techniques for assessment of potential mineral development impacts to aquatic communities are presented.

78/31 CHRISTMAN, S. P., AND W. S. LIPPINCOTT, JR. 1978. Rare and endangered vertebrates of the Southeastern U.S. coastal plain—a summary of public concern for sensitive wildlife. 46 pp.

Includes a table presenting species cited as endangered or threatened in the southeastern U.S., including which species are protected in which areas, and which species are being proposed for protection.

78/32 ECOLOGY CONSULTANTS, INC. 1978. Capture locations of rare fish in the Upper Colorado River system. 50 pp.

This is Part Two of a study (Part One is *FWS/OBS*-78/13) and provides information on the distribution of rare fish species in the Upper Colorado River system. Capture locations are plotted for Colorado, Utah, Wyoming, and New Mexico.

78/33 MILHOUS, R. R., ET AL. 1978. Hydraulic simulation in instream flow studies: theory and techniques. IFIP No. 5. 143 pp.

Several types of techniques for the prediction of the stage-discharge relationship and the velocity distribution-discharge relationship are presented, along with general limitations and site-imposed constraints pertaining to each type of simulation technique.

78/34 HYRA, R. 1978. Methods of assessing instream flows for recreation. IFIP No. 6. 52 pp.

This paper describes two techniques for performing recreational instream flow studies. The single cross section method is discussed briefly. The majority of the paper deals with the more sophisticated incremental method of assessing instream flows. Stream flow suitability criteria for recreation are presented for both methods.

78/35 to 78/47 Each of the 12 reports in this series focuses on identifying and evaluating the most promising methods for reserving instream flows to benefit fish and wildlife in a particular western State.

78/35 NELSON, W., ET AL. 1978. Instream flow strategies for Arizona. 100 pp.

78/36 NELSON, W., ET AL. 1978. Instream flow strategies for California. 106 pp.

78/37 NELSON, W., ET AL. 1978. Instream flow strategies for Colorado. 101 pp.

78/38 NELSON, W., ET AL. 1978. Instream flow strategies for Idaho. 107 pp.

78/39 NELSON, W., ET AL. 1978. Instream flow strategies for Montana. 112 pp.

78/40 NELSON, W., ET AL. 1978. Instream flow strategies for Nevada. 100 pp.

78/41 NELSON, W., ET AL. 1978. Instream flow strategies for New Mexico. 94 pp.

78/42 NELSON, W., ET AL. 1978. Instream flow strategies for North Dakota. 109 pp.

78/43 NELSON, W., ET AL. 1978. Instream flow strategies for Oregon. 124 pp.

78/44 NELSON, W., ET AL. 1978. Instream flow strategies for South Dakota. 107 pp.

78/45 NELSON, W., ET AL. 1978. Instream flow strategies for Utah. 99 pp.

78/46 NELSON, W., ET AL. 1978. Instream flow strategies for Washington. 120 pp.

78/47 NELSON, W., ET AL. 1978. Instream flow strategies for Wyoming. 97 pp.

78/48 AVERY, M. L., EDITOR. 1978. Impacts of transmission lines on birds in flight. 151 pp.

Contains the proceedings of a 3-day workshop to assess the problem, review available knowledge, and identify research needs on the impacts of electric power transmission lines on local and migratory movements of birds. The workshop was organized and sponsored by the National Power Plant Team and Oak Ridge Associated Universities.

78/49 to 78/53 This series of five maps ranks Federal coal-producing lands in five Western States. Ranks are assigned according to the value of the lands for big and small game wildlife. These rankings are designated to evaluate the impacts of leasing coal in wildlife areas.

78/49 COLORADO DIVISION OF WILDLIFE. 1978. Ranking of Federal coal lands. Vol. 1, Colorado. 30 pp.

78/50 MONTANA DEPT. OF FISH AND GAME. 1978. Ranking of Federal coal lands. Vol. 2, Montana. 30 pp.

78/51 NORTH DAKOTA GAME AND FISH DEPARTMENT. 1978. Ranking of Federal coal lands. Vol. 3, North Dakota. 11 pp.

78/52 UTAH DIVISION OF WILDLIFE RESOURCES. 1978. Ranking of Federal coal lands. Vol. 4, Utah. 47 pp.

78/53 WYOMING GAME AND FISH DEPARTMENT. 1978. Ranking of Federal coal lands. Vol. 5, Wyoming. 188 pp.

78/54 LONGLEY, W. L., R. JACKSON, AND B. SNYDER. 1978. Managing oil and gas activities in coastal environments. 63 pp.

For use by petroleum engineers, land managers, government officials, and others interested in preserving living resources. This report is intended to assist coastal land managers in reducing the impacts of oil and gas development on natural resources.

78/55 EAGLES, T. W., J. L. COHON, C. S. REVELLE, AND J. R. CURRENT. 1979. Multiobjective programming in power plant location planning. 58 pp.

This study develops conceptual objectives for the minimization of impacts on the terrestrial and aquatic environment, implements these objectives in an operational location model, and demonstrates trade offs between costs and the environmental impacts of power plants.

78/56 NELSON, W., ET AL. 1978. Western reservoir and stream habitat improvement handbook. 250 pp.

This handbook describes and evaluates the success of 286 habitat and population improvement measures that were recommended for 90 Federal dam and reservoir projects in 19 Western States. All improvement measures are accompanied by engineering drawings; cost/output data; evaluation of intended purposes; inherent limitations; past performances; and actual applications.

78/57 OFFICE OF BIOLOGICAL SERVICES. 1977. Electric power generation and transmission decisions affecting fish and wildlife resources. 99 pp.

This report discusses the existing regulatory operations of Federal and State agencies. It also defines the timing and requirements of key events within the decision-making process as they affect the licensing (construction, operations permits) of electric generation facilities. Key decisions which may affect fish and wildlife resources have been identified and discussed.

78/58 SPRINGER, P. F., AND N. S. DAILEY. 1978. Avian mortality at man-made structures: an annotated bibliography. 108 pp.

This bibliography contains 853 summarized references pertaining to bird mortality due to collision and electrocution at man-made structures such as power transmission lines, radio and TV towers, lighthouses, cooling towers, buildings, and airport ceilometers. Subject, taxonomic, and geographic indexes are included.

78/59 OFFICE OF BIOLOGICAL SERVICES. 1978. An approach to stream classification.

This brochure describes *FWS/OBS*-78/23, Stream Classification 1977.

78/60 GUSTAVSON, T. C., ET AL. 1977. Ecological implications of geopressured-geothermal energy development: Texas–Louisiana Gulf Coast region. 670 pp.

This study contains two main sections in which the ramifications of the commercial development of thermal-hydraulic energy for the generation of power are reviewed from the different perspectives of the Gulf Coast region as an energy resource and as an ecological resource.

78/61 BAYHA, K. 1978. Instream flow methodologies for regional and national assessment. IFIP No. 7. 98 pp.

This paper provides an indepth accounting of the effort made over a 4-year period to consider instream flow values as part of the Water Resource Council's Second National Water Assessment. It also summarizes a new method, developed subsequent to the National Assessment effort, which may provide an improved basis for assessing instream flow needs for level A and B planning studies.

78/62 [Not issued]

78/63 [Not issued]

78/64 SALMEN, L., ET AL. 1978. Map indexing system: user's manual. 36 pp.

This manual describes the Map Indexing System (MIS) component of the FWS geographic information system. The manual contains a general overview of MIS components, directions on using the MIS to evaluate data bases, and suggestions on where to search if data is not in the system.

78/65 GOODYEAR, C. P. 1978. Entrainment impact estimates using the equivalent adult approach. 14 pp.

One approach to analyzing the importance of entrainment of fish eggs and larvae by power plants has been to estimate the number of adults that would have resulted from the entrained larvae. Certain limitations of a commonly used model can lead to serious underestimates of the actual impact. These limitations are discussed and an alternative formulation is presented which will reduce the bias.

78/66 STEVENSON, J. C., AND N. M. CONFER. 1978. Summary of available information on Chesapeake Bay submerged vegetation. 335 pp.

Information on submerged aquatic vegetation in the Chesapeake Bay was compiled from a literature search. Information includes biological summaries of dominant plant species, environmental values of aquatic plants, historic documentation, factors related to aquatic plant occurrence and growth, modelling, and management options.

78/67 [Not issued]

78/68 PRUITT, T. A., ET AL. 1978. Recommended stream resource maintenance flows on seven southern Idaho streams. IFIP No. 8. 67 pp.

This paper documents the results of instream flow investigations conducted on seven southern Idaho streams during 1972–1975. The results were reanalyzed using the concept of probability-of-use curves which are based on weighted criteria for depth and velocity. Recommended stream resource maintenance flows are presented.

78/69 GREEN, K. A. 1978. A conceptual ecological model for Chesapeake Bay. 22 pp.

A conceptual model for the Chesapeake Bay ecosystem (wetlands, tributaries, and bay proper) has been developed as an interrelated series of diagrams showing carbon and nutrient pathways. Information was based on an analysis of local literature and discussions with scientists who are studying the Bay. The ecological functions that produce the resources of commercial and recreational fisheries, habitat for migratory birds and other wildlife, waste disposal, and aesthetic water quality are indicated.

78/70 MOREHOUSE, T. A., R. A. CHILDERS, AND L. E. LEASK. 1978. Fish and wildlife protection in the planning and construction of the Trans-Alaska oil pipeline. 131 pp.

Focuses on fish and wildlife protection issues in the course of planning, establishing, and conducting monitoring activities; explores the rationale behind the decisionmaking process; and offers recommendations for improved environmental management in future cases.

78/71 CHRISTMAN, S. P., H. I. KOCHMAN, AND W. S. LIPPINCOTT. 1978. Annotated bibliography of the fish and wildlife resources of Galveston Bay. 2 vols. Vol. I, 652 pp.; Vol. II, 345 pp.

An annotated bibliography of 1,600 references on fish and wildlife resources of Galveston Bay, Texas. Included are references on the ecology of the Galveston Bay system, upland areas adjacent to Galveston Bay in Harris, Chambers, and Galveston

counties and the marine environment offshore of Galveston Bay to the minus 60-foot contour in the Gulf of Mexico. Vol. I includes abstracts and Vol. II provides an index.

78/72 [Not issued]

78/73 [Not issued]

78/74 SHANKS, L. R. 1978. Coastal systems and management options related to Outer Continental Shelf (OCS) development. 13 pp.

Assists local and State coastal planners in assessing onshore impacts of oil and gas developments on the Outer Continental Shelf. Major topics addressed include coastal system characteristics and physical and biological alterations of various operations.

78/75 LEWIS, B. G., P. C. CHEE, R. M. GOLDSTEIN, F. C. KORNEGOY, D. L. MABES, L. F. SOHOLT, AND W. S. VINIKOUR. 1978. A biologist's manual for the evaluation of impacts of coal-fired power plants on fish, wildlife, and their habitats. 206 pp.

Included are a description of coal-fired power plants and a discussion of power plant features having the potential for adverse effects on fish, wildlife, and their habitats. Information includes a description of each feature, summary of impacts, standards and criteria for evaluation, quantification of data, information requirements and sources, impact analysis, additional data sources, and references. The manual is designed to be used with *FWS/OBS*-78/29.

78/76 MARMELSTEIN, A., CHAIRMAN. 1977. Classification, inventory, and analysis of fish and wildlife habitat—the proceedings of a national symposium, January 1977. 604 pp.

Includes papers presented at the symposium 24–27 January 1977, in Phoenix, Arizona. Subjects deal with user needs in the area of habitat classification; the various classification systems now in use for wetlands, wildlife habitats, and terrestrial and aquatic ecosystems; and ecological relationships important in habitat classification.

78/77 WOODWARD-CLYDE CONSULTANTS. 1978. Impact prediction manual for geothermal development. 200 pp.

This manual presents techniques for predicting probable effects of geothermal development on fish and wildlife resources in the West. Part One deals with the concepts underlying the manual; Part Two discusses cause-and-effect and describes qualitative and quantitative analysis of impacts. Appendices include an annotated bibliography; an example of a data collection program; a listing of endangered, threatened, and protected flora and fauna; and a supplement to erosion analysis techniques outlined in the manual.

78/78 SOWLS, A. L., S. A. HATCH, AND C. J. LENSINK. 1978. Catalog of Alaskan seabird colonies. 153 maps plus appendices.

A summary of data on the location, size, and species composition of seabird colonies along the Alaskan coast. The data are presented in the form of maps and tables showing the species composition and populations of all seabirds on a site-specific basis.

78/79 STEENHOF, K. 1978. Management of wintering bald eagles. 59 pp.

Provides managers of sanctuaries and public lands with information about managing land for bald eagles (*Haliaeetus leucocephalus*). This handbook is appropriate for lands used by migratory northern bald eagles during the nonbreeding winter season. Included are a review of the literature on species characteristics and requirements during winter, and management guidelines.

78/80 TERRELL, T. T. 1979. Physical regionalization of coastal ecosystems of the United States and its territories. 30 pp.

This project formulates a hierarchical regional classification scheme for partitioning coastal ecosystems of the U.S. and its territories, based on physical (hydrological and geological) characteristics. This classification will: (1) provide a data collection structure; and (2) delineate geographical zones about which predictions on the structure and functioning of ecosystems within these zones may be made.

78/81 SAMUEL, D. E., J. R. STAUFFER, C. H. HOCUTT, AND W. T. MASON, JR., EDITORS. 1978. Surface mining and fish/wildlife needs in the eastern United States: proceedings of a symposium. 386 pp.

This symposium explored the relationships between mining and fish and wildlife, and the effect of P.L.95-87 (Surface Mining Control and Reclamation Act of 1977). Paper topics include lands unsuitable for mining; planning for fish and wildlife needs; methods for impact assessment; mining effects on water quality, aquatic and terrestrial wildlife; mined land reclamation; and wildlife management on mined lands.

78/81A SAMUEL, D. E., J. R. STAUFFER, C. H. HOCUTT, AND W. T. MASON, JR., EDITORS. 1979. Surface mining and fish/wildlife needs

in the eastern United States: addendum to proceedings of a symposium. 125 pp.

Panel discussion supplementing symposium proceedings in *FWS/OBS*-78/81.

78/82 YORKE, T. A. 1978. Impact assessment of water resource development activities: a dual-matrix approach. 27 pp.

A dual-matrix system for reviewing and evaluating the impact of water development projects on fish and wildlife resources is discussed. The system consists of generalized matrices; state-of-the-art literature reviews and syntheses for evaluating impacts, alternatives, and mitigation methodology; and a computer model for quantifying impacts. The generalized matrix presented in this report consists of summary statements of the impact of common water development projects on selected physical and chemical characteristics of streams.

78/83 BOWLES, R. R., U. V. MERRINER, AND G. C. GRANT. 1978. Factors associated with accuracy in sampling fish eggs and larvae. 82 pp.

Ichthyoplankton sampling gear is reviewed and evaluated with emphasis on power plant impact assessment. Effects of biotic and abiotic factors on gear accuracy are discussed. A listing of commonly used sampling gear has been compiled and indexed by ecosystem. Features to be optimized in gear design and deployment are summarized.

78/84 RAFAILL, B. L., AND W. G. VOGEL. 1978. A guide for vegetating surface-mined lands for wildlife in eastern Kentucky and West Virginia. 89 pp.

A guidebook to aid land managers, landowners, and mine operators in revegetating surface-mined areas for wildlife. General wildlife requirements are discussed and particular wildlife species considered. In addition, habitat requirements and general planting patterns of benefit to wildlife are discussed and illustrated.

78/85 HUISH, M. T., AND G. B. PARDUE. 1978. Ecological studies of one channelized and two unchannelized coastal swamp streams in North Carolina. 72 pp.

This study was conducted to develop baseline information on the ecology of streams in coastal wooded swamps of the southeastern U.S. for use in impact assessment. Material is presented on stream chemical and physical characteristics, fish, and macroinvertebrates. The baseline data are valuable for predicting the consequences of modifying stream morphometry or flows in southern coastal swamp streams. Ecological differences between unchannelized and channelized streams are identified. The basic field data are included as a microfiche attachment.

78/86 UTAH STATE UNIVERSITY. 1978. Rehabilitation of western wildlife habitat: a review. 238 pp.

This publication provides a review of information regarding both the habitat requirements of key wildlife species and land rehabilitation techniques that have been successful. The geographic focus is on those habitats and rehabilitation efforts west of the cultivated prairies, with special emphasis placed on actual or anticipated sites of surface mining. Additional research needs are identified, as well as methods to improve the integration of habitat research and rehabilitation technology.

78/87 TESKEY, R. O., AND T. M. HINCKLEY. 1978. Impact of water level changes on woody riparian and wetland communities. Vol. IV, Eastern deciduous forest region. 54 pp.

See series abstract under *FWS/OBS*-77/57.

78/88 TESKEY, R. O., AND T. M. HINCKLEY. 1978. Impact of water level changes on woody riparian and wetland communities. Vol. V, Northern forest region. 54 pp.

See series abstract under *FWS/OBS*-77/57.

78/89 TESKEY, R. O., AND T. M. HINCKLEY. 1978. Impact of water level changes on woody riparian and wetland communities. Vol. VI, Plains grassland region. 29 pp.

See series abstract under *FWS/OBS*-77/57.

78/90 BOREMAN, J., C. P. GOODYEAR, AND S. W. CHRISTENSEN. 1978. An empirical transport model for evaluating entrainment of aquatic organisms by power plants. 67 pp.

This report presents the mathematical development of the generalized model, termed the Empirical Transport Model (ETM), along with several alternative formulations that could be used depending on the level of detail in data obtained from field studies. The model is applied to a hypothetical population inhabiting an estuary where several power plants are proposed to be sited.

78/91 FREDRICKSON, L. H. 1979. Floral and faunal changes in lowland hardwood forests in Missouri resulting from channelization, drainage, and impoundment. 130 pp.

Provides a description of flora and fauna in lowland hardwood forests that were channelized, drained, or impounded near the St.

Francis River, Missouri. Topics included effects on species composition, density, reestablishment, and growth of plants in lowland hardwood communities; effects on indicator species; and techniques for monitoring and predicting changes in flora and fauna. Alternatives for water resource developments are discussed.

78/92 SCHMAL, R. N., AND D. F. SANDERS. 1978. Effects of stream channelization on aquatic macroinvertebrates, Buena Vista Marsh, Portage County, Wisconsin. 80 pp.

An assessment of effects of channelization on density and biomass of benthic and drifting macroinvertebrates, amount of drifting seston, and water temperature and chemistry in the Buena Vista Marsh, Wisconsin. Data from 1974–1976 are presented from natural streams, newly channelized and old channelized ditches.

78/93 WALTERS, M. A., R. O. TESKEY, AND T. M. HINCKLEY. 1980. Impact of water level changes on woody riparian and wetland communities. Vol. VII, Mediterranean region, western arid and semi-arid region. 90 pp.

See series abstract under *FWS/OBS*-77/57.

78/94 WALTERS, M. A., R. O. TESKEY, AND T. M. HINCKLEY. 1980. Impact of water level changes on woody riparian and wetland communities. Vol. VIII, Pacific Northwest and Rocky Mountain regions. 53 pp.

See series abstract under *FWS/OBS*-77/57.

78/95 OFFICE OF BIOLOGICAL SERVICES. 1978. Mined land reclamation for fish and wildlife in the eastern United States. 12 pp.

This brochure discusses the Surface Mining Control and Reclamation Act, and its implication to fish and wildlife resources. It makes the point that regardless of the intended land use, there are ways to include fish and wildlife in the reclamation plan.

78/96 SALMEN, L., J. GROPPER, J. HAMILL, AND B. GENTRY. 1978. MOSS User's Manual. n.p.

The Map Overlay and Statistical System (MOSS) User's Manual is designed for trained users of the MOSS interactive graphics software. MOSS has been designed to allow users to retrieve, spatially analyze, and display any map data stored in the system.

78/97 MONTANARI, J. H., AND J. A. KUSLER, CO-CHAIRMAN. 1978. Proceedings of the National wetland protection symposium, Reston, Virginia, June 6–8, 1977. 255 pp.

A collection of papers from a symposium on wetland protection. Paper topics include an overview of wetland hazards and values, development impacts, State wetland programs, Federal agency roles in wetland protection, wetland uses and misuses, legal issues, wetland mapping, wetland rehabilitation, role of the private sector and the public, and research priorities.

78/98 KUSLER, J. A. 1978. Strengthening state wetland regulations. 147 pp.

This report was prepared to assist States in developing and strengthening wetland protection programs. It examines State and conjunctive State and local wetland protection efforts and suggests improvements. Two versions of a draft statute provide a basis for new wetland protection efforts.

78/99 [Not issued]

79/01 OFFICE OF BIOLOGICAL SERVICES. 1979. Coastal ecosystems characterizations—a summary of activities FY75 through FY79. 21 pp.

A summary of activities of two FWS projects, designed to gather ecological information for use in the development of effective methods to protect habitats and manage fish and wildlife resources in coastal ecosystems that may be impacted by energy development. Coastal areas studied include the Chenier Plain of Louisiana and Texas, the Pacific Northwest, the Sea Islands of South Carolina and Georgia, and the Maine coast.

79/02 LITTLE, R. L., AND J. W. HARDY. 1979. Development and evaluation of information transfer procedures for Fish and Wildlife Service field offices and Biological Services teams. 31 pp.

Results of an information transfer pilot project designed to define the roles and responsibilities of the Biological Services Program in bridging the gap betweem FWS research and operations.

79/03 OFFICE OF BIOLOGICAL SERVICES. 1979. Elements in negotiating stream flows associated with federal projects. Info. Pap. No. 9. 41 pp.

This report incorporates ideas for use in negotiations intended to solve water resource planning problems and makes that information available to encourage discussion and exploration of the issues presented.

79/04 [Not issued]

79/05 to 79/07 This 3-volume series describes the ecological characteristics of the Mississippi Deltaic Plain region. The overall study purpose was to collect, organize, and analyze available information from various disciplines (e.g., geology, biology, socioeconomics) that will describe each part of the regional ecosystem, and its relation to the whole. *See also FWS/OBS*-81/16.

79/05 LARSEN, D. K., ET AL. 1980. Mississippi Deltaic plain ecological characterization: a socioeconomic study. Vol. I, synthesis papers. 368 pp.

79/06 LARSEN, D. K., ET AL. 1980. Mississippi Deltaic plain ecological characterization: a socioeconomic study. Vol. II, map narratives. 112 pp.

79/07 WICKER, K. M. 1980. Mississippi Deltaic plain ecological characterization: a habitat mapping study. A user's guide to the habitat maps. 79 pp.

This guide is designed to be used with the habitat maps published in *FWS/OBS*-79/06.

79/08 KORSCHGEN, C. E., AND R. M. ERWIN. 1979. Coastal waterbird colonies: Maine to Virginia, 1977. An atlas showing colony locations and species composition. 647 pp.

Surveys were conducted during the spring and summer of 1976 and 1977 to locate and describe all nesting colonies of coastal waterbirds from the Maine–Canada border to the southern boundary of Virginia. Both aerial and ground methods were used to obtain estimates of nesting populations. The maps and tables in this atlas report the findings of these surveys.

79/09 KORSCHGEN, C. E. 1979. Coastal waterbird colonies: Maine. 83 pp.

Waterbird colonies along the coast of Maine were inventoried during the nesting seasons of 1976 and 1977. A total of 353 colony sites was found; they contained 100,813 pairs of birds. Nineteen species nested in the study area. A count of nests of adult birds made during on-site inspections was the best inventory technique. Species abundance and nesting locations are listed.

79/10 ERWIN, R. M. 1979. Coastal waterbird colonies: Cape Elizabeth, Maine to Virginia. 212 pp.

In 1976 and 1977, seabird and wading bird nesting colonies were inventoried along the northeast U.S. Coast from Cape Elizabeth, Maine to the Virginia–North Carolina border. A parallel study was conducted for the rocky, island bound coastal region of Maine, north of Cape Elizabeth. Colonies were surveyed and censused from March to July by teams of biologists using aerial and ground-based methods.

79/11 to 79/15 This series of publications presents the results of one of four similar projects of the Fish and Wildlife Service to characterize key coastal areas of the United States. The intent is to provide the means of assessing and minimizing impacts of human activities in important fish and wildlife habitats. This ecological characterization serves the needs of decision makers and researchers by supplying integrated information for impact assessments and analyses, and uncovering research needs.

79/11 PROCTOR, C. M., ET AL. 1980. An ecological characterization of the Pacific northwest coastal region. Vol. 1., conceptual model. 224 pp.

The general framework for organizing the characterization is contained in this first volume.

79/12 PROCTOR, C. M., ET AL. 1980. An ecological characterization of the Pacific Northwest coastal region. Vol. 2., characterization atlas—regional synopsis. 574 pp.

79/13 PROCTOR, C. M., ET AL. 1980. An ecological characterization of the Pacific Northwest coastal region. Vol. 3., characterization atlas, zone and habitat descriptions. 327 pp.

79/14 PROCTOR, C. M., ET AL. 1980. An ecological characterization of the Pacific Northwest coastal region. Vol. 4., classification atlas, watershed unit descriptions. 551 pp.

79/15 PROCTOR, C. M., ET AL. 1980. An ecological characterization of the Pacific Northwest coastal region. Vol. 5., data source appendix. 70 pp.

79/16 NELSON, W. R., AND L. G. BECKMAN. 1979. Entrainment of ichthyoplankton by irrigation withdrawal systems. 36 pp.

This study was designed to: (1) determine the potential for entraining ichthyoplankton by synthesizing the location and number of irrigation structures with knowledge of the reproductive characteristics of Missouri River fishes; (2) develop a methodology to sample irrigation pump effluents and determine the extent of ichthyoplankton entrainment; and (3) evaluate and update present guidelines to conform with the study's results.

79/17 [Not issued]

79/18 [Not issued]

79/19 and 79/19A — Provides a framework for standard, consistent collection of ecological facts concerning species of vertebrates and selected invertebrates. The data catalog format is designed to facilitate computerized data entry.

79/19 — MASON, W. T., JR., C. T. CUSHWA, L. J. SLASKI, AND D. N. GLADWIN. 1979. A procedure for describing fish and wildlife: coding instructions for Pennsylvania. 21 pp.

79/19A — CUSHWA, C. T., ET AL. 1980. A procedure for describing fish and wildlife for Pennsylvania: summary evaluation report. 15 pp.

79/20 — [Not issued]

79/21 — [Not issued]

79/22 — GALVIN, M. 1979. Management of transmission line rights-of-way for fish and wildlife.

Vol. I: Background information. 168 pp.
Vol. II: Eastern U.S. 347 pp.
Vol. III: Western U.S. 519 pp.

Volume I presents general information on wildlife management and vegetation maintenance techniques for aiding in the development and implementation of resource management plans in overhead electric transmission line rights-of-way. Volume II contains specific information on plant responses to rights-of-way maintenance methods in the eastern U.S. Volume III provides information similar to Volume II for the western U.S.

79/23 — STICKEL, L. F., AND M. P. DIETER. 1979. Ecological and physiological/toxicological effects of petroleum on aquatic birds. A summary of research activities FY76 through FY78. 14 pp.

The physiological and ecological effects of oil on waterbirds were examined in a series of laboratory and field experiments, including studies of the effects of oiling on hatchability of eggs; the effects of an oil-contaminated diet on physiological condition, reproduction, and survival; and the accumulation of oil in body tissues. A chemical methodology was developed in support of these studies.

79/24 — STEVENSON, J. C., N. CONFER, AND C. B. PIEPER. 1979. Decline of submerged aquatic plants in Chesapeake Bay. 12 pp.

This brochure summarizes highlights of a study on the decline of submerged aquatic grass beds in the Chesapeake Bay, entitled: "Summary of Available Information on Chesapeake Bay Submerged Vegetation," by University Maryland Laboratory Center for Environmental Estuarine Studies at Horn Point, Maryland.

79/25 — LEEDY, D. L. 1979. An annotated bibliography on planning and management for urban-suburban wildlife. 256 pp.

This bibliography identifies various publications dealing with management of urban and suburban wildlife, and provides background information helpful to planners, biologists, and others in the development and management of wildlife resources in urban and suburban areas.

79/26 — OFFICE OF BIOLOGICAL SERVICES. 1979. Biological Services Program report, FY77–78. 98 pp.

Describes the activities of the Biological Services Program (BSP). Includes a summary of projects and a bibliography of BSP publications.

79/27 — OFFICE OF BIOLOGICAL SERVICES. 1979. Cooperative Instream Flow Service Group, September 1977–December 1978. 16 pp.

This brief report is intended to serve as both an introduction to the Instream Flow Group and its second annual report. It recaps the history of the Group, its goals and activities.

79/28 — OFFICE OF BIOLOGICAL SERVICES. 1979. Mississippi deltaic plain region characterization study. 9 pp.

Brochure describing the project which resulted in the publication of *FWS/OBS*-79/05, 79/06, and 79/07.

79/29 — [Not issued]

79/30 — VAN BEEK, V. L., ET AL. 1981. An introduction to the environmental literature of the Mississippi Deltaic Plain Region. 208 pp.

This report is a review of selected environmental literature of the Mississippi Deltaic Plain region. This review introduces some of the major ecosystem components and processes, describes oil and gas production activities, and guides the reader to available literature.

79/31 — COWARDIN, L. M. 1979. Classification of wetlands and deepwater habitats of the United States. 103 pp.

Describes a new classification system for wetlands and deepwater habitats, designed to replace the FWS Circular 39 System. This new classification describes ecological taxa, arranges them in a system useful to resource managers, furnishes units for mapping, and provides uniformity of concepts and terms. Wetlands are classified by plants, soils, and frequency of flooding.

79/32 NATIONAL COASTAL ECOSYSTEMS TEAM. 1979. Bibliographic search capabilities—Revision C. 11 pp.

Describes the bibliographic search capabilities of the National Coastal Ecosystems Team. Presented are a comprehensive list of available bibliographic resources, a partial list of nonbibliographic data bases, a checklist for preparation of an information request, and a sample computer search.

79/33 DAVIS, G. J., AND M. M. BRINSON. 1980. Responses of submersed vascular plant communities to environmental change. 79 pp.

This report examines the responses of submersed vascular plants to changing environmental conditions, primarily those that affect light transmission. Survival indices were also calculated for several species typically found in clearwater lakes. The report concludes with a brief discussion of the potential effects of human activities on submersed plant communities. A summary of this publication can be found in *FWS/OBS*-80/42.

79/34 [Not issued]

79/35 BYRNE, J. E., EDITOR. 1979. Literature review and synthesis of information on Pacific island ecosystems. 337 pp.

This volume consists of ten sections, each containing a category of information about Pacific islands under U.S. jurisdiction: (1) wildlife refuges and endangered species; (2) terrestrial botany; (3) birds; (4) freshwater macrofauna; (5) marine plants; (6) coral reefs; (7) marine macroinvertebrates excluding corals and reef-building organisms; (8) reef and shore fishes; (9) harvested marine resources; and (10) socioeconomics.

79/36 SWEETMAN, D. A. 1980. Protecting instream flows in Montana: Yellowstone River Reservation case study. IFIP No. 10. 75 pp.

The intent of this paper is to provide a review of the method utilized by the Montana Board of Natural Resources and Conservation in making the Yellowstone River reservation determinations. It also discusses the usefulness of this form of water allocation.

79/37 LAMB, B. L., AND D. A. SWEETMAN. 1979. Guidelines for preparing expert testimony in water management decisions related to instream flow issues. IFIP No. 1, revised. 33 pp.

The guidelines provide instructions and background information to biologists who believe their work may become part of a formal adjudication or administrative hearing. Topics covered include types of hearings, discovery procedures, and rules of evidence. Samples of testimony are also included. (Supersedes *FWS/OBS*-77/19.)

79/38 [Not issued]

79/39 PETERSON, C. H., AND N. M. PETERSON. 1979. The ecology of intertidal flats of North Carolina: a community profile. 73 pp.

Description of intertidal flats community, including the physical environment, plants, benthic fauna, mobile epibenthic invertebrates, fish, and birds. Provides background needed by coastal planners and environmental scientists.

79/40 to 79/45 This series of six publications presents the results of one of four similar projects of the Fish and Wildlife Service to characterize key coastal areas of the United States. The intent is to provide the means of assessing and minimizing impacts of human activities in important fish and wildlife habitats. This ecological characterization serves the needs of decision makers and researchers by supplying integrated information for impact assessments and analyses, and uncovering research needs.

79/40 MATHEWS, T. D., ET AL., EDITORS. 1980. Ecological characterization of the Sea Island coastal region of South Carolina and Georgia. Vol. I, physical features of the characterization area. 212 pp.

79/41 MATHEWS, T D., ET AL., EDITORS. 1980. Ecological characterization of the Sea Island coastal region of South Carolina and Georgia. Vol. II, socioeconomic factors. 321 pp.

79/42 MATHEWS, T. D., ET AL., EDITORS. 1980. Ecological characterization of the Sea Island coastal region of South Carolina and Georgia. Vol. III, biological features. 620 pp.

79/43 MATHEWS, T. D., ET AL., EDITORS. 1980. Ecological characterization of the Sea Island coastal region of South Carolina and Georgia. Vol. IV, atlas. 35 pp.

79/44 MATHEWS, T. D., ET AL., EDITORS. 1979. Directory of information sources. 1979. 35 pp.

79/45 MATHEWS, T. D., ET AL., EDITORS. 1980. Ecological characterization of the Sea Island coastal region of South Carolina and Georgia. Executive summary. 51 pp.

79/46 LEWIS, D. A., AND G. F. KUACIR. 1979. Great Lakes information management system (GLIMS) contractor guidelines. 32 pp.

This manual summarizes the U.S. Fish and Wildlife Service Great Lakes Information Management System (GLIMS) and specifies the basic procedures to be used by contractors supplying data to the system. The system contains map-based natural resource data.

79/47 [Not issued]

79/48.1 SCIENCE APPLICATIONS, INC. 1980. A summary of fish and wildlife information needs to surface mine coal in the United States. Part 1, fish and wildlife information needs in the Federal surface mining permanent regulations. 103 pp.

Designed to assist government agencies and private citizens in determining fish and wildlife information needs for new coal mining operations pursuant to the Surface Mining Control and Reclamation Act of 1977. Included are: (1) summary of references to fish and wildlife in SMCRA permanent regulations; and (2) selected sections of the surface mining permanent Federal regulations dealing with fish and wildlife needs.

79/48.2 SCIENCE APPLICATIONS, INC. 1980. A summary of fish and wildlife information needs to surface mine coal in the United States. Part 2, the status of State surface mining regulations as of January 1980 and the fish and wildlife information needs. 61 pp.

Documentation of fish and wildlife information needs identified in the State regulations of compliance to PL95-87. Also includes documentation of the status of individual State surface mining regulations as of January 1980 in those States having significant strippable reserves or active strip-mining operations.

79/48.3.1 to 79/48.3.5 This series consists of five handbooks, one for each of the Office of Surface Mining (OSM) regions. Each handbook contains information on protection and enhancement of, and reduction of impacts to, fish and wildlife resources during the surface mining of coal. It gives information pertaining to consideration of fish and wildlife resources in the premining, mining, reclamation, and compliance phases of surface mining. Suggested methods and sources for obtaining the information necessary to satisfy State and Federal regulations for each particular OSM region are included.

79/48.3.1 HINKLE, C. R., R. E. AMBROSE, AND C. R. WENZEL. 1981. A handbook for meeting fish and wildlife information needs to surface mine coal—OSM Region I. 145 pp. plus appendices.

79/48.3.2 HINKLE, C. R., R. E. AMBROSE, AND C. R. WENZEL. 1981. A handbook for meeting fish and wildlife information needs to surface mine coal—OSM Region II. 368 pp.

79/48.3.3 HINKLE, C. R., R. E. AMBROSE, AND C. R. WENZEL. 1981. A handbook for meeting fish and wildlife information needs to surface mine coal—OSM Region III. 367 pp.

79/48.3.4 HINKLE, C. R., R. E. AMBROSE, AND C. R. WENZEL. 1981. A handbook for meeting fish and wildlife information needs to surface mine coal—OSM Region IV. 363 pp.

79/48.3.5 HINKLE, C. R., R. E. AMBROSE, AND C. R. WENZEL. 1981. A handbook for meeting fish and wildlife information needs to surface mine coal—OSM Region V. 405 pp.

79/49 OFFICE OF BIOLOGICAL SERVICES. 1979. Habitat Preservation Abstracts. 103 pp.

Habitat Preservation Abstracts is an announcement publication intended to make the information provided by the Habitat Preservation Programs of the U.S. Fish and Wildlife Service more widely known and accessible.

This publication brings together information on the Biological Services, Environmental Contaminants Evaluation, and Land and Water Resource Development Planning Programs.

80/01 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States.

The purpose of this series of species accounts is to provide resource managers and the public with information about federally listed endangered and/or threatened vertebrate species that occur along, or within 100 km of, the seacoast of the United States. Information about life history, distribution, habitat requirements, and conservation of the subject species is included.

80/01.1 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the red wolf. 6 pp.

80/01.2 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—blunt-nosed leopard lizard. 6 pp.

80/01.3 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the whooping crane. 9 pp.

80/01.4 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the light-footed clapper rail. 7 pp.

80/01.5 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—San Clemente loggerhead shrike. 5 pp.

80/01.6 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the pine barrens treefrog. 5 pp.

80/01.7 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the red-cockaded woodpecker. 9 pp.

80/01.8 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—ivory-billed woodpecker. 9 pp.

80/01.9 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the ocelot. 5 pp.

80/01.10 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the Attwater's greater prairie chicken. 5 pp.

80/01.11 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the Cape Sable sparrow. 6 pp.

80/01.12 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the leatherback sea turtle. 7 pp.

80/01.13 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—green sea turtle. 9 pp.

80/01.14 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the Texas blind salamander. 5 pp.

80/01.15 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Yuma clapper rail. 7 pp.

80/01.16 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Santa Barbara song sparrow. 5 pp.

80/01.17 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Eskimo curlew. 7 pp.

80/01.18 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—southern sea otter. 8 pp.

80/01.19 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the Morro Bay kangaroo rat. 5 pp.

80/01.20 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—California least tern. 8 pp.

80/01.21 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Kirtland's warbler. 5 pp.

80/01.22 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Hawksbill turtle. 6 pp.

80/01.23 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the Indiana bat. 8 pp.

80/01.24 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the Atlantic salt marsh snake. 5 pp.

80/01.25 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the dusky seaside sparrow. 6 pp.

80/01.26 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Hawaiian goose (NENE). 9 pp.

80/01.27 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Columbian white-tailed deer. 6 pp.

80/01.28 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—salt marsh harvest mouse. 5 pp.

80/01.29 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Puerto Rican parrot. 7 pp.

80/01.30 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Kemp's (Atlantic) Ridley sea turtle. 7 pp.

80/01.31 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Bachman's warbler. 4 pp.

80/01.32 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the Florida Everglade kite. 5 pp.

80/01.33 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Puerto Rican whip-poor-will. 6 pp.

80/01.34 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Aleutian Canada goose. 9 pp.

80/01.35 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—West Indian manatee. 9 pp.

80/01.36 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—island night lizard. 5 pp

80/01.37 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the Delmarva Peninsula fox squirrel. 6 pp.

80/01.38 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the Houston toad. 6 pp

80/01.39 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the American alligator. 9 pp.

80/01.40 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the brown pelican, eastern and California subspecies. 16 pp.

80/01.41 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the jaguar. 6 pp.

80/01.42 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the gray bat. 7 pp.

80/01.43 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the Okaloosa darter. 5 pp.

80/01.44 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the eastern cougar. 4 pp.

80/01.45 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the jaguarundi. 5 pp.

80/01.46 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the Florida panther. 8 pp.

80/01.47 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the American crocodile. 7 pp.

80/01.48 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the key deer. 7 pp.

80/01.49 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Laysan duck. 6 pp.

80/01.50 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Red Hills salamander. 4 pp.

80/01.51 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Arctic peregrine falcon. 9 pp.

80/01.52 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Mississippi sandhill crane. 8 pp.

80/01.53 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—the gray wolf. 11 pp.

80/01.54 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—thick-billed parrot. 8 pp.

80/01.55 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—San Clemente sage sparrow. 4 pp.

80/01.56 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—California clapper rail. 7 pp.

80/01.57 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—American peregrine falcon. 14 pp.

80/01.58 NATIONAL FISH AND WILDLIFE LABORATORY. 1980. Selected vertebrate endangered species of the seacoast of the United States—Santa Cruz long-toed salamander. 6 pp.

80/02 JEHL, J. R., JR., M. J. WHITE, JR., AND S. I. BOND. 1980. Effects of sound and shock waves on marine vertebrates: an annotated bibliography. 6 pp.

This report introduces resource managers and researchers to the literature about the interaction between underwater acoustic signals and fishes, birds, and mammals. Topics include the effects of various noises and explosions and the use of sound as an attractant or deterrent.

80/03 AINLEY, D. G., ET AL. 1980. Beached marine birds and mammals of the North American west coast: a manual for their census and identification. 207 pp.

Provides information necessary for the correct identification of beachcoast specimens of marine birds and mammals. Identification keys are supplemented by illustrations, glossaries, and narrative accounts of species. Instructions are included for the conduct of beach surveys. Species included are marine birds and mammals that occur from the Bering Strait, Alaska, along the North American Coast south to Cabo San Lucas at the southern tip of Baja California, Mexico.

80/04 ROWLETT, R. A. 1980. Observations of marine birds and mammals in the northern Chesapeake bight. 87 pp.

Summary of observations on the spatial and temporal distributions of marine birds and mammals observed in Atlantic Ocean waters over the Continental Shelf between latitudes 37°N and 39°N. These records were gathered from 1971–1977 off the coasts of Delaware, Maryland, and Virginia.

80/05 PORTNOY, J. W., R. M. ERWIN, AND T. W. CUSTER. 1981. Atlas of gull and tern colonies: North Carolina to Key West, Florida. 121 pp.

Colonies of pelicans, cormorants, gulls, terns, and black skimmers were inventoried in 1976 from North Carolina to Key West, Florida. Five teams of investigators used ground and aerial counts of nests or adults, or both, throughout the spring and summer. This atlas shows the location of each known active colony and includes information on nesting site and substrate, species composition and numbers, nesting stage, and inventory method.

80/06 HANDWERGER, H. A., AND K. A. GILDREN. 1980. Guide to the National Power Plant Team's bibliographic data base. 48 pp.

This guide describes the automated bibliographic files of the National Power Plant Team's library. This system is no longer functional.

80/07 ALLEN, K. O. 1980. Impacts of navigational dredging on fish and wildlife: a literature review. 81 pp.

Literature about the impacts of navigational dredging on fish, other aquatic biota, and wildlife is reviewed. Also included are types of dredging equipment, characteristics of dredged material, evaluation of dredged material pollution potential, and habitat development and enhancement opportunities arising from dredged material disposal. The discussions about impacts and habitat development are divided into "Coastal Waters" and "Rivers." A limited discussion of the "Great Lakes" is included as an appendix.

80/08 and 80/09 A 5-year investigation of the effects of floodplain gravel mining on the physical and biological characteristics of river systems in arctic and subarctic Alaska is described. Twenty-five sites were studied within four geographic regions. The field data collection program covered the major disciplines of hydrology/hydraulics, aquatic biology, water quality, and terrestrial biology. In addition, geotechnical engineering and aesthetics site reviews were conducted.

80/08 WOODWARD-CLYDE CONSULTANTS. 1980. Gravel removal studies in arctic and subarctic floodplains in Alaska. 403 pp.

Synthesizes and evaluates the data collected at the sites.

80/09 WOODWARD-CLYDE CONSULTANTS. 1980. Gravel removal guidelines manual for arctic and subarctic flood plains. 169 pp.

Aids the user in planning and operating material sites to minimize environmental effects. (See abstract on p. 47).

80/10 HENLEY, D. E., AND D. G. RAUSCHUBER. 1981. Freshwater needs of fish and wildlife resources in the Nueces–Corpus Christi Bay Area, Texas: a literature synthesis. 410 pp.

Topics include short- and long-term freshwater needs; ecological impact of reduced freshwater inflows; impact of and need for return flows of domestic, industrial, and agricultural water into the Bay system; ecological impact of the proposed Harbor Island Deep-Water Port construction on the Bay system; and recommendations for freshwater inflow management.

80/11 and 80/12 These reports synthesize and annotate available literature relating to the effects of bank stabilization on the physical and chemical characteristics of streams. Annotated references to the literature which formed the basis for the synthesis are contained in *FWS/OBS*-80/12. The synthesis, *FWS/OBS*-80/11, provides guidelines for lanning bank protection and stabilization activities.

80/11 EASTERN ENERGY AND LAND USE TEAM. 1980. Effects of bank stabilization on the physical and chemical characteristics of streams and small rivers: a synthesis. 43 pp.

80/12 EASTERN ENERGY AND LAND USE TEAM. 1980. Effects of bank stabilization on the physical and chemical characteristics of streams and small rivers: an annotated bibliography. 88 pp.

80/13 and 80/14 These reports describe an investigation of the effects of stream channelization on fish and macroinvertebrates in low gradient reaches of Blacksmith Fork River and the Logan River in northern Utah. The long-term physical and biological consequences of channel modification, especially with regard to the high value fishery resource, are of special concern.

80/13 WYDOSKI, R. S., AND W. T. HELM. 1980. Effects of alterations to low gradient reaches of Utah streams: summary. 17 pp.

A summary of *FWS/OBS*-80/14.

80/14 WYDOSKI, R. S., AND W. T. HELM. 1980. Effects of alterations to low gradient reaches of Utah streams. 176 pp.

80/15 GOSSELINK, J. 1980. Tidal marshes–the boundary between land and ocean. 12 pp.

This brochure describes estuarine intertidal emergent wetlands; topics include human impacts, origins of tidal marshes, marsh ecosystem and food chain, and the value of tidal marshes.

80/16 BIDERMAN, J. O., AND W. H. DRURY. 1980. The effects of low levels of oil on aquatic birds–a nontechnical summary of research activities FY76 through FY78. 5 pp.

A summary of research activities from July 1975 to September 1978 concerning the effects of petroleum on aquatic birds. Topics include: effects of oiling on egg hatchability; effects of oil ingestion on physiological condition, survival, and reproduction in birds; accumulation and loss of oil by birds; and development of analytical methods for identification and quantification of oil breakdown products in tissues and eggs of ducks.

80/17 BARCLAY, J. S. 1980. Impact of stream alterations on riparian communities in south-central Oklahoma. 91 pp.

This report summarizes the findings of a study undertaken to supply information of a quantitative nature on the effects of stream channelization and impoundment on riparian wildlife and vegetation within the southern grasslands of the United States. The study supplies data on channelization and land use changes from 16 study sites and on the effects of impoundment from four study sites on tributaries of the Washita River, all located within grassland ecoregions in Oklahoma.

80/18 OFFICE OF BIOLOGICAL SERVICES. 1980. Power plant project workshop.

Limited distribution slide show.

80/19 and 80/20 The purpose of this study is to compile and synthesize information from existing sources concerning the natural, physical, and social components of the ecosystems with the 24-county study area along the coast of Texas. The topics of the socioeconomic papers compiled in Volume 1 are oil and gas production, recreation/tourism industry, commercial fishing, transportation, industrial and residential development and agricultural production. Data compilations in the form of tables and charts that support these papers are in Volume 2.

80/19 LIEBOW, E. B., ET AL. 1980. Texas barrier islands region ecological characterization: a socioeconomic study. Vol. 1, synthesis papers. 277 pp.

80/20 LIEBOW, E. B., ET AL. 1980. Texas barrier islands region ecological characterization: a socioeconomic study. Vol. 2, data appendix. 500 pp.

80/21 [Not issued]

80/22 HANLEY, P. T., ET AL. 1981. Natural resource protection and petroleum development in Alaska. 323 pp.

This report reviews administrative roles, authorities, procedures, and decisionmaking processes for oil and gas leasing and postlease environmental management for both the State and Federal governments. Past and present oil exploration and development efforts in Alaska, and a general assessment of the most promising areas for future exploration are reviewed. Industry practices associated with each phase of petroleum development and their potential effects on fish, wildlife, and habitat are presented.

80/22.1 HANLEY, P. T. ET AL. 1981. Natural resource protection and petroleum development in Alaska: a summary. 39 pp.

A summary of *FWS/OBS*-80/22.

80/23 HANLEY, P. T., J. E. HEMMING, AND J. W. MORSELL. 1983. A handbook for management of oil and gas activities on lands in Alaska: petroleum industry practices, environmental impacts and stipulations. 66 pp.

Presents information on the characteristics and environmental effects of oil and gas development and activities in Alaska. Environmental disturbances and impact mitigation are also discussed. The kinds of information required for the design of effect mitigation measures are included in the final chapter.

80/24 and 80/25 Volume I of this two-volume report provides information on the extent and nature of Eastern surface coal mining; its environmental effects, especially on fish and wildlife; and reclamation efforts. Volume I also discusses P.L. 95-87, the Surface Mning Law of 1977, outlining its major role, and the roles of other laws in fish and wildlife resource management. Volume II is intended primarily for planners and managers of fish and wildlife resources in connection with various surface coal mining and reclamation activities.

80/24 LEEDY, D. L. 1981. Coal surface mining reclamation and fish and wildlife relationships in the eastern United States. Vol. I, past findings, the surface Mining Law of 1977 (P.L. 95-87), future planning and management considerations, and information sources. 75 pp.

80/25 LEEDY, D. L., AND T. M. FRANKLIN. 1981. Coal surface mining reclamation and fish and wildlife relationships in the eastern United States. Vol. II, opportunities and approaches for fish and wildlife planning and management in coal surface mining, reclamation and postmining land use. 169 pp.

80/26 OFFICE OF BIOLOGICAL SERVICES. 1980. Biological evaluation of environmental impacts—the proceedings of a symposium. 237 pp.

The Council on Environmental Quality and the Ecological Society of America sponsored a symposium at 1976 meeeting of the American Institute of Biological Sciences. The symposium dealt with the contributions that the science of ecology was bringing to the field of environmental impact assessment, to facilitate exchange of information concerning the present state of impact assessment.

80/27 LEWIS, J. C., AND E. W. BUNCE, EDITORS. 1980. Rehabilitation and creation of selected coastal habitats: proceedings of a workshop. 162 pp.

Nineteen papers from workshop at Sapelo Island, Georgia, May 1976. Topics include techniques for creation of salt marshes, sand dunes, seagrass beds, and rehabilitation of coastal areas.

80/28 CLUGSTON, J. P., EDITOR. 1980. Proceedings of the Clemson Workshop on environmental impacts of pumped storage hydroelectric operations. 206 pp.

Presents the results of a workshop held at Clemson, South Carolina on 15-16 May 1979. Discusses environmental problems associated with the development of pumped-storage hydroelectric facilities. Topics included effects on various aquatic ecosystem components.

80/29 FEFER, S. I., AND P. A. SCHETTIG. 1980. An ecological characterization of coastal Maine.

Vol. I-III: Overview, v. p.
Vol. IV: Appendixes. v. p.
Vol. V: Data source appendix. 265 pp.
Vol. VI: Atlas. 18 pp.

Information about the natural resources of coastal Maine north and east of Cape Elizabeth, presented in an ecological framework to help guide resource management decisions and coastal planning and to evaluate human impacts on the ecosystem.

80/30 FORE, P. L., AND R. D. PETERSON, EDITORS. 1980. Proceedings of the Gulf of Mexico coastal ecosystem workshop: Office of

Environment, Region 2, U.S. Fish and Wildlife Service. 214 pp.

The purpose of the workshop was to provide information to coastal decision makers on recent developments in coastal ecology related to assessing the impact of human activities on fish and wildlife resources. Topics discussed included the permitting process, productivity of seagrasses, contributions of wooded swamps to estuarine productivity, management of barrier islands, oil and gas development in coastal marshes, State and Federal relations in the coastal zone, adaptive environmental assessment, and the ecological role of selected coastal habitats.

80/31 OFFICE OF BIOLOGICAL SERVICES. 1980. Summary plan for application of coastal characterizations to energy-related developments. 9 pp.

80/32 TRIAL, J. G., L. M. DEMION, AND J. G. STANLEY. 1980. The dual matrix and other environmental impact assessment methods. 54 pp.

Summarizes seven different existing environmental assessment methods, with particular emphasis on the Dual Matrix approach. Methodologies developed by the U.S. Fish and Wildlife Service are included.

80/33 SOHOLT, L. F., ET AL. 1980. Handling of combustion and emission-abatement wastes from coal-fired power plants: implications for fish and wildlife resources. 191 pp.

Coal combustion ashes and flue-gas desulfurization (FGD) sludges, the solid waste products from coal-fired facilities, contain a number of trace elements that can be toxic to biota if they are available in sufficient quantities. Dispersal of constituents from waste-storage sites occurs primarily by runoff, seepage, and wind erosion. This report contains qualitative and quantitative methods for evaluating the potential impacts from these routes of dispersal in site-specific situations.

80/34 FRITZ, E. S., P. J. RAGO, AND I. P. MURARKA. 1980. Strategy for assessing impacts of power plants on fish and shellfish populations. 79 pp.

Describes a strategy for conducting biological studies to eliminate the acquisition of irrelevant and extraneous data, increase efficiency of data collection, and increase reliability of conclusions related to predicted or measured impacts as applied to all types of developments in any type of environment, terrestrial or aquatic.

80/35 LEEDY, D. L., T. M. FRANKLIN, AND R. M. MAESTRO. 1981. Planning for urban fishing and waterfront recreation. 116 pp.

This document is intended to help planners and developers enhance fishing and waterfront recreation in urban areas by preserving existing high-quality aquatic areas, restoring degraded areas, and creating new areas where appropriate. Background information about fish and wildlife values, the nature of aquatic ecosystems, urbanization effects on these systems, planning and management implications, and the importance of aquatic resource considerations in urban-suburban planning are discussed.

80/36 [Not issued]

80/37 SOWLS, A. L. ET AL. 1980. Catalog of California seabird colonies. 371 pp.

Summarizes the location, size, and species composition of seabird colonies along the California coast. More than 260 nesting areas with a total estimated population of nearly 700,000 birds are documented. This information will aid resource planners to evaluate possible effects on seabirds of proposed oil and gas leasing.

80/38 OFFICE OF BIOLOGICAL SERVICES. 1980. Volcanic ash problems and concerns for fish and wildlife. 34 pp.

The eruption of Mount St. Helens prompted this set of observations on the short- and long-term impacts of volcanic ash on fish, wildlife, and their habitat. It contains information adapted from a manual on the disposal of coal ash and scrubber sludge.

80/39 ANDERSON, S. H., P. H. GEISSLER, AND D. K. DAWSON. 1980. Coastal and marine bird data base. 66 pp.

Discusses the development of a coastal and marine bird data base at the Migratory Bird and Habitat Research Laboratory. The system is described and is compared with other data bases. Suggestions for future development, such as adaptations for other taxonomic groups, are included. Examples are given for heron and pelagic bird data which indicate the types of analyses that can be conducted.

80/40.1 to 40.17 This ongoing series, entitled "Air Pollution and Acid Rain," is a group of publications relating to the effects of air emissions and acid deposition on fish and wildlife resources. Overviews of a variety of ecosystems and regions are included.

80/40.1 NEWMAN, J. R. 1980. Effects of air emissions on wildlife resources. 32 pp.

80/40.2 FRITZ, E. S. 1980. Potential impacts of low pH on fish and fish populations. 17 pp.

80/40.3 PETERSON, M. A. 1982. The effects of air pollution and acid rain on fish, wildlife, and their habitats—introduction. 198 pp.

80/40.4 PETERSON, M. A. 1982. The effects of air pollution and acid rain on fish, wildlife, and their habitats—lakes. 123 pp.

80/40.5 POTTER, W., AND B. K. CHANG. 1982. The effects of air pollution and acid rain on fish, wildlife, and their habitats—rivers and streams. 55 pp.

80/40.6 BORGHI, L. 1982. The effects of air pollution and acid rain on fish, wildlife, and their habitats—forests. 90 pp.

80/40.7 PETERSON, M. A. The effects of air pollution and acid rain on fish, wildlife, and their habitats—grasslands. 63 pp.

80/40.8 OLSON, J. E. 1982. The effects of air pollution and acid rain on fish, wildlife, and their habitats—arctic tundra and alpine meadow. 31 pp.

80/40.9 MIRSKY, E. N., AND D. HARPER. 1982. The effects of air pollution and acid rain on fish, wildlife, and their habitats—deserts and steppes. 41 pp.

80/40.10 PETERSON, M. A. 1982. The effects of air pollution and acid rain on fish, wildlife, and their habitats—urban ecosystems. 94 pp.

80/40.11 PETERSON, M. A., AND D. ADLER. 1982. The effects of air pollution and acid rain on fish, wildlife, and their habitats—critical habitats of threatened and endangered species. 57 pp.

80/40.12 OFFICE OF BIOLOGICAL SERVICES. 1982. Effect of acid precipitation on aquatic resources: results of modeling workshops. 150 pp.

80/40.13 FRASER, J. E., AND D. L. BRITT. 1982. Liming of acidified waters: a review of methods and effects on aquatic ecosystems. 189 pp.

80/40.14 OFFICE OF BIOLOGICAL SERVICES. 1982. Liming of acidified waters: issues and research—a report of the International Liming Workshop. 35 pp.

80/40.15 HAINES, T. A., J. AKIELASZEK, AND P. RAGO. 1983. A regional survey of the chemistry of headwater lakes and streams in New England: vulnerability to acidification. 157 pp.

80/40.16 WIENER, J. G. 1983. Comparative analyses of fish populations in naturally acidic and circumneutral lakes in northern Wisconsin. 107 pp.

80/40.17 GIBSON, J., ET AL. 1983. Rocky Mountain acidification study. 137 pp.

80/40.18 HAINES, T. A., AND J. J. AKIELASZEK. 1984. Effects of acidic precipitation on Atlantic salmon rivers in New England. 108 pp.

80/41 SCHMIDLY, D. J. 1981. Marine mammals of the southeastern United States coast and the Gulf of Mexico. 175 pp.

All of the available data from a 1979 study/survey on the distribution and abundance of marine mammals in the study area was synthesized for this report. The information on cetaceans and pinnipeds is presented in two sections: an analysis of observations and individual species accounts. The former compares the frequency of strandings, sightings, and captures for each species each month. The species accounts present distribution, abundance, status, seasonal movements, and life history for 35 species.

80/42 DAVIS, G. J., AND M. M. BRINSON. 1980. Responses of submersed vascular plant communities to environmental changes: summary. 17 pp.

This is a condensation of a more comprehensive, technical publication by the same authors entitled "Responses of submersed vascular plant communities to environmental change, *FWS/OBS*-79/33." Environmental parameters discussed include: light transmission, fluctuating water levels, wave action, sedimentation, nutrients, and seasonal effects. Potential impacts of various developmental activities are discussed briefly.

80/43 FUIMAN, L. A., EDITOR. 1980. Proceedings of the fourth annual larval fish conference. 185 pp.

Contains 15 papers and 1 abstract of presentations made during the conference, held at the University of Mississippi on 27–28 February 1980. Papers deal with larval fish biology, including discussions of taxonomy, distribution, feeding, and growth.

80/44 STUTZMAN, K. F. 1980. Issues in fish and wildlife planning: water resources planning under the Fish and Wildlife Coordination Act. 56 pp.

This paper briefly discusses the more significant provisions of the Fish and Wildlife Coordination Act (1958). It covers pertinent

aspects of legislative history, the development and current status (April 1980) of certain policies relevant to administering the Act, and other matters. It is directed primarily to practicing fish and wildlife agency field biologists, planners, and decision makers engaged in water resources development activities under the Act.

80/45 to 80/49 This characterization covers an area of approximately 22,500 mi^2 along the California Coast south of the California–Oregon border. It is an ecological integration of information into one data base including physical-chemical features and processes, biological resources, and socio-economic activities of this coastal region.

80/45 JONES AND STOKES ASSOCIATES, INC. 1981. An ecological characterization of the central and northern California coastal region. Vol. I, basic ecological concepts. 209 pp.

80/46.1 JONES AND STOKES ASSOCIATES, INC. 1981. An ecological characterization of the central and northern California coastal region. Vol. II, Part 1, regional characterization. 450 pp.

80/46.2 JONES AND STOKES ASSOCIATES, INC. 1981. An ecological characterization of the central and northern California coastal region. Vol. II, Part 2, species. 682 pp.

80/47.1 JONES AND STOKES ASSOCIATES, INC. 1981. An ecological characterization of the central and northern California coastal region. Vol. III, Part 1, habitats. 473 pp.

80/47.2 JONES AND STOKES ASSOCIATES, INC. 1981. An ecological characterization of the central and northern California coastal region. Vol. III, Part 2, community. 879 pp.

80/48 JONES AND STOKES ASSOCIATES, INC. 1981. An ecological characterization of the central and northern California coastal region. Vol. IV, watersheds and basins. 1395 pp.

80/49 JONES AND STOKES ASSOCIATES, INC. 1981. An ecological characterization of the central and northern California coastal region. Vol. V, data source appendix. 77 pp.

80/50 IRVINE, A. B., J. E. CAFFIN, AND H. I. KOCHMAN. 1981. Aerial surveys for manatees and dolphins in western peninsular Florida (with notes on sightings of sea turtles and crocodiles). 21 pp.

Low altitude aerial surveys were conducted at approximately monthly intervals from August to December 1979 to count West Indian manatees (*Trichechus manatus*) and bottlenose dolphins (*Tursiops truncatus*) in western peninsular Florida. Sightings of sea turtles, turtle tracks, and a crocodile were also noted.

80/51 BECCASIO, A. D., ET AL. 1980. Atlantic coast—ecological inventory. 163 pp.

This study provides an inventory of important ecological resources along the Atlantic Coastal Zone, an area of some 196,840 km^2 (76,000 mi^2). This inventory is intended to provide government and industry decision-makers with valuable ecological information which will assist in the regional siting of oil- and gas-processing and manufacturing facilities and their respective transportation systems. Ecological resources are summarized by their appropriate geographic zone, and descriptions and locations of species with special status and aquatic and terrestrial species of high commercial, recreational, and aesthetic value are included.

80/52 [Not issued]

80/53 WHITE, M. R., F. D. VALDEZ, AND M. D. WHITE. 1980. Instream flow negotiation: review of practices. 50 pp.

The different approaches to negotiations as they apply to managing instream flows are reviewed in this report. Negotiations are comprised of many factors, including debate, persuasion, cooperation, and compromise.

80/54 AVERY, M. L., P. F. SPRINGER, AND N. S. DAILEY. 1980. Avian mortality at man-made structures: an annotated bibliography (revised). 155 pp.

This bibliography provides references to studies of bird mortality due to collisions with man-made structures. Radio and TV towers, buildings, power lines, and cooling towers are some of the structures considered. This updates the original bibliography, *FWS/OBS*-78/55.

80/55 NOLDE, M., ET AL. 1980. Streamside areas—management dividends. 16 pp.

This nontechnical publication is aimed at stimulating interest among ranchers and landowners in improving streamside zones. It emphasizes the importance of streamside zones for fish, wildlife, and domestic livestock, and the interrelationship of those resources. Agencies that can assist landowners in developing management plans, and funding sources for implementation of the plans are also listed.

80/56 MENEELY, S. C., S. L. DUZAN, AND S. D. SCHEMNITZ. 1979. Impacts of uranium

mining and milling upon the fish and wildlife resources of the New Mexico San Juan Basin Region. 159 pp.

This report identifies fish and wildlife species on Indian lands within the San Juan Basin of New Mexico, Arizona, and Colorado. Impacts of uranium milling and mining at existing and proposed mine sites are identified, and recommendations for mitigation measures were included.

80/57 HORAK, G. C., AND J. E. OLSON. 1980. Proceedings of the uranium mining and milling workshop. 105 pp.

The proceedings summarize a 2-day workshop held on 28–29 May 1980. Participants from government agencies and the private sector presented information on their involvement with uranium development. Recommendations for Fish and Wildlife Service initiatives related to uranium development were presented and ranked.

80/58 MIKOL, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. 60 pp.

Field procedures are discussed for line transect sampling to estimate the abundance of nongame birds. The methods are oriented toward habitats and species in the Northern Great Plains, but much of the information is applicable to any habitat or species. Problems in data collection are emphasized.

80/59 CAREY, R. C., P. S. MARKOVITS, AND J. B. KIRKWOOD. 1981. Proceedings: U.S. Fish and Wildlife Service workshop on coastal ecosystems of the southeastern United States. 269 pp.

This workshop was held in Big Pine Key, Florida, from 18–22 February 1980. Its purpose was to provide training on recent developments in understanding coastal ecosystems in the Southeast for FWS field personnel and other natural resource managers in the region. Major emphasis was given to three types of ecosystems: marshes, mangroves, and sea grasses.

80/60 DAHLBERG, M. D., J. W. DUNCAN, AND J. M. BURKE. 1980. Winter fish populations in probable locations of air bubblers in the St. Mary's River–Lake Superior area. 50 pp. plus appendixes.

A winter (1979–1980) survey was conducted of fish, benthic macroinvertebrates, and selected physicochemical parameters at five bubbler sites proposed for the St. Mary's River and Whitefish Bay. Two bibliographies were also prepared and are included as appendixes to this report. Subjects were: "Ecological effects of air bubblers in the winter, a partially annotated bibliography" and "Annotated bibliography on winter fish and macrobenthos communities of St. Mary's River, Lake Superior, and Lake Huron."

80/61 [Not issued]

80/62 LISTON, C. R., ET AL. 1980. Environmental baseline and evaluation of the St. Mary's River dredging. 295 pp.

The purpose of this study was to gather predredging (baseline) physical, chemical, and biological data at both the proposed dredging site and disposal area. Objectives of the study were to: (1) sample aquatic flora and fauna; (2) sample water and sediments to determine chemical and physical parameters; (3) relate aquatic flora and fauna to physical and chemical data; (4) predict what dredging effects might be; (5) document unique or important habitats; and (6) identify dominant or important flora and fauna of the study area.

80/62.1 LISTON, C. R., ET AL. 1981. Supplementary environmental baseline studies and evaluation of the St. Mary's River during 1980. v.p.

This data supplements similar information published in *FWS/OBS*-80/62.

80/63 [Not issued]

80/64 BARR ENGINEERING CO., BATHER-RINGROSE-WOLFSFELD-JARVIS-GARDNER, INC., AND J. P. BOROVSKY. 1980. Enhancement of fish and wildlife resources in the reclamation of hard rock mined lands in the upper Midwest: a guidelines manual. 131 pp.

Identifies the state-of-the-art in current mineland reclamation practices in the Upper Midwest, particularly in the development of fish and wildlife habitat. Designed to encourage inclusion of wildlife habitat enhancement considerations in the reclamation planning process.

80/65 CAMP, DRESSER, AND MCKEE, INC. 1981. Effects of peat mining on fish and other aquatic organisms in the upper Midwest. 72 pp.

This study reviews the literature pertinent to peatlands and peat mining in order to determine the effects of peat mining on aquatic animal life. The paper proposes to describe the peatland aquatic habitat and fauna, to compare existing and proposed peat mining techniques in light of peat mining possibilities for alternate energy sources, to suggest possible mitigation of undesirable effects, and to identify important data gaps in the literature.

80/66 [Not issued]

80/67 NAWROT, J. R., A. WOOLF, AND W. D. KLIMSTRA. 1982. A guide for enhancement of fish and wildlife on abandoned mine lands in the eastern United States. 100 pp.

The guide is intended to promote the incorporation of fish and wildlife habitat enhancement into the reclamation of abandoned mine lands under the provisions of the Surface Mining Control and Reclamation Act of 1977 (Title IV, P.L. 95-87). The primary audience is State reclamation planners, but the guide is also useful to State natural resources agencies, the Office of Surface Mining, and the Fish and Wildlife Service.

80/68 HERRICKS, E. E., ET AL. 1981. Best current practices for fish and wildlife on surface-mined lands in the eastern interior coal region. 212 pp.

Developed to aid surface coal mine operators in identifying and implementing the best current practices (BCP's) for protecting and improving fish and wildlife resources on their minesite during both the active coal extraction and postmining phases of their operation. The area of concern is the Illinois Coal Basin, comprised by the States of Illinois, western Indiana, and western Kentucky. Technical references listed at the end of each practice provide background and theory from which the techniques were developed.

80/69 NATIONAL COASTAL ECOSYSTEMS TEAM. 1981. Chesapeake Bay characterization study plans.

81/01 WHITLATCH, R. B. 1982. The ecology of New England tidal flats: a community profile. 125 pp.

Provides a general perspective of tidal flats of New England, the organisms commonly associated with them, and the importance of tidal flats to the coastal zone viewed as a whole. Each chapter discusses a component of the tidal flats ecosystem, and incorporates the published information available at the time of writing. The last chapter (Chapter 6) considers the response of tidal flats to environmental perturbation as well as their value to the New England coastal zone.

81/02 OHIO STATE UNIVERSITY. 1980. Fish and wildlife resources of the Great Lakes coastal wetlands within the United States.

Vol. 1: Overview. 480 pp.
Vol. 2: Lake Ontario. 1351 pp.
Vol. 3: Lake Erie. 530 pp.
Vol. 4: Lake Huron. 834 pp.
Vol. 5: Lake Michigan. 1676 pp.
Vol. 6: Lake Superior. 901 pp.

A total of 1,370 coastal wetlands were identified along the U.S. coast of the Great Lakes. Each is identified and topography, soils, hydrology, climate, biotic setting, and cultural setting are used to describe the wetlands. Lists of flora and fauna are included.

81/03 HEDGEPATH, J. W., AND S. OBREBSKI. 1981. Willapa Bay: a historical perspective and a rationale for research. 52 pp.

The purpose of this report is to suggest information that will be valuable in planning for the management of the aquatic resources of the bay. The effects of logging and other land use practices in the basin are taken into account.

81/04 CROSS, R. D., AND D. L. WILLIAMS, EDITORS. 1981. Proceedings of national symposium on freshwater inflow to estuaries. 1053 pp.

This two-volume proceedings includes 76 papers on the institutional and management problems of providing freshwater inflow to estuaries, ecological effects of modifying freshwater inflow, and suggested measures to bring freshwater inflow into water planning. The problems of freshwater inflow include reduction in volume due to inland water diversions, modification of seasonal flow regimes, reduction in water quality, and alteration of sediment and nutrient content. Freshwater inflow problems were identified in Raritan Bay, Chesapeake Bay, southern Florida, the Gulf of Mexico, San Francisco Bay, and the Columbia River estuary.

81/05 SOHOLT, L. F., ET AL. 1981. Coal combustion waste manual: evaluating impacts to fish and wildlife. 151 pp.

With the anticipated accelerated use of coal as an energy source, a concomitant increase can be expected in the potential for impacts to fish and wildlife resources. The goal of this manual is to provide quantitative guidelines, where possible, for evaluating the potential extent of habitat disturbance from waste constituent dispersal. Criteria are also provided for evaluating the potential for impact from trace elements in the waste.

This manual is designed to be used in conjunction with *FWS/OBS*-80/33.

81/06 HONIG, R. A., R. J. OLSON, AND W. T. MASON, JR. 1981. Atlas of coal/minerals and important resource problem areas for fish and wildlife in the conterminous United States. 107 pp.

The atlas highlights areas of potential concern involving coal and minerals development activities and fish and wildlife resources, in particular the Important Resource Problem Areas (IRP's) designated in 1980 by the U.S. Fish and Wildlife Service as areas of emphasis in policymaking. The atlas serves as an initial screening tool for national and regional planners and administrators to help define areas that may require additional analysis prior to development in order to minimize disturbances and adverse impacts on fish and wildlife resources and to protect and enhance these resources where practicable.

81/07 OFFICE OF BIOLOGICAL SERVICES. 1981. Playa Lakes symposium proceedings. 136 pp.

This report represents the proceedings of the Playa Lakes Symposium sponsored by the U.S. Fish and Wildlife Service in Arlington, Texas in December 1979. Twelve papers are included covering topics in playa resources development, playa lakes ecology, impacts of playa modification, and authorities and responsibilities for playa resources. The papers provide a broad overview of the playa lakes issue from the Federal, State, and private perspectives and outline the elements essential to consider in any management plan for that resource.

81/08 TURNER, L. J., AND D. K. FOWLER. 1981. Utilization of surface mine ponds in east Tennessee by breeding amphibians. 20 pp.

Breeding amphibians were found in 21 of 24 ponds examined on the Ollis Creek Surface Mine in Campbell County, Tennessee. Twelve species of amphibians were identified in ponds that range from 4.0 to 8.0 in pH. Although ponds with low pH values were used by breeding amphibians, significantly more amphibian species were found in ponds with higher pH values. Findings indicated high biological productivity in the surface mine ponds examined.

81/09 FOWLER, D. K., L. J. TURNER, AND L. J. SLASKI. 1981. Surface mine reclamation for wildlife: a model reclamation plan for southern Appalachia. 30 pp.

A reclamation plan for use on surface coal mines in southern Appalachia is presented. Included are suggestions relative to the establishment of groundcover and trees and the retention of surface water on mine sites. All techniques mentioned in the plan benefit wildlife and will assist the operator in achieving bond release. This plan has been implemented cooperatively by TVA and the FWS on a mine site in Campbell County, Tennessee.

81/10 [Not issued]

81/11 GORDON, S. L., H. L. LUNDBLAD, AND C. A. WESCOTT. 1981. National Coastal Ecological Research: existing and proposed energy developments. 158 pp.

The purpose of this National Coastal Ecological Research report was to compile existing information about energy developments in the coastal zone. Information was gathered on existing and proposed energy developments in order to allow some assessment of future impacts in the coastal zone from energy-related developments.

81/12 HANDEL, C. M., ET AL. 1981. An annotated bibliography of literature on Alaska water birds. 515 pp.

This annotated bibliography contains 1,554 citations of published and unpublished references on waterbirds in Alaska. References which either report on field studies conducted in Alaska or deal specifically with ornithology in Alaska have been included. The content of each paper has been summarized and indexed by subject, species, and geographic location. The bibliography is divided into four sections: seabirds; waterfowl and other water birds; shorebirds; and avifauna.

81/13 FORSELL, D. J., AND P. J. GOULD. 1981. Distribution and abundance of marine birds and mammals in the Kodiak area of Alaska. 81 pp.

Forty-four species of seabirds and ten species of marine mammals were observed during the winter of 1979–1980 in the Kodiak Archipelago. The species composition of seabirds in the area shifted considerably between summer and winter. Prime habitats for seabirds wintering in the Kodiak area include ice-free estuaries and lagoons for puddle ducks; marine waters less than 25 m deep with rock substrates for seaducks; and waters near the 100-m isobath in mid-bay for murres.

81/14 [Not issued]

81/15 BAHR, L. M., AND W. P. LANIER. 1981. The ecology of intertidal oyster reefs of the South Atlantic coast: a community profile. 105 pp.

The functional role of the intertidal oyster reef community in the southeastern Atlantic coastal zone is described. The profile is organized in a hierarchical manner. Relevant details of reef oyster biology (autecology) are presented, followed by a description of the

reef community level of organization. Then the reef community is described as a subsystem of the coastal marsh-ecosystem (synecology). The final chapter includes a summary overview and a section on management implications and guidelines.

81/16 GAROFALO, D. 1982. Mississippi deltaic plain region ecological characterization: an ecological atlas. 96 pp. and 72 maps.

81/17 BRINSON, M. M., ET AL. 1981. Riparian ecosystems: their ecology and status. 154 pp.

This report is a comprehensive review and synthesis of information on the ecological values of riparian ecosystems. Chapters are included on the following topics: status of riparian ecosystems in the U.S.; ecological functions and properties of riparian ecosystems; importance of riparian ecosystems to fish and wildlife; and considerations in valuation (ecologic and economic) of riparian ecosystems. The report is a technical summary of extensive literature reviews and personal communications with Federal and State agencies.

81/18 [Not issued]

81/19 [Not issued]

81/20 [Not issued]

81/21 [Not issued]

81/22 LONGLEY, W. L., R. JACKSON, AND B. SNYDER. 1981. Managing oil and gas activities in coastal environments: refuge manual. 466 pp.

This report documents the management of oil and gas development on national wildlife refuges on the Louisiana and Texas coasts. It explains the nature of ownership, leasing rights, and legal considerations related to oil and gas extraction on refuges. The report describes five Federal refuges selected for analysis and the different marsh and estuarine ecosystems found on the refuges and in the coastal zone. It explains oil and gas extraction and transport methods used in coastal systems, and examines how each habitat is affected by these activities.

81/23 [Not issued]

81/24 ODUM, W. E., C. C. MCIVOR, AND T. J. SMITH, III. 1982. The ecology of the mangroves of South Florida: a community profile. 154 pp.

A detailed description is given of the community structure and ecosystem processes of the mangrove forests of south Florida based upon a compilation of data and hypotheses from published and unpublished sources. Information covered ranges from details of mangove distribution, primary production, and diseases to aspects of reproduction, biomass partitioning, and adaptations to stress. Mangrove ecosystems are considered in terms of zonation, succession, litter fall and decomposition, carbon export, and energy flow.

81/25 DICKSON, K. L., AND D. VANCE. 1981. Revegetating surface mined lands for wildlife in Texas and Oklahoma. 120 pp.

This guide includes procedures and discussions encouraging the preservation and reclamation of surface mined lands in Texas and Oklahoma for wildlife. Even on those sites where reclamation will be oriented primarily toward agricultural purposes (e.g., tame pasture, commercial forest, etc.), there are numerous ways to include wildlife in the reclamation plan. Methods and procedures are recommended that will promote diversity in habitats to attract and support wildlife.

81/26 BEST, L. B., ET AL. 1981. Impact of stream alteration and grazing on riparian communities in Iowa. 54 pp.

The purpose of this study was to determine the effects of short-reach stream channelization on land-use practices and the impacts of these effects on riparian plant and animal communities. Changes in land use were relatively minor with small declines in herbaceous fields and pastures and increases in cultivated crops. Bird and small mammal use of riparian land was closely correlated to the availability of forests and woodlands.

81/27 GALLAWAY, B. J. 1981. An ecosystem analysis of oil and gas development on the Texas-Louisiana Continental Shelf. 97 pp.

The Texas-Louisiana shelf ecosystem in the Gulf of Mexico is described in terms of its physiographic, oceanographic, and biological characteristics and as an area of oil and gas development activities and effluents. Data from most field studies indicate that direct effects are limited in space, but the effects over time are unknown. Future research should be directed towards defining key processes governing the ecosystem, with modeling workshops serving as the focus for these research and monitoring programs.

81/28 [Not issued]

81/29 BAILEY, R. G., AND C. T. CUSHWA. 1981. Ecoregions of North America. 1 pp.

Eco-regions of North America are described, as defined by their distinctive climates, vegetation, and soils. Regions are divided into three ecologic levels which are number-coded for fish and wildlife, and analysis and data management.

81/30 BECCASIO, A. D., ET AL. 1981. Pacific coast ecological inventory: user's guide and information base. 159 pp.

Thirty fish and wildlife coastal inventory maps were prepared to provide energy facility planners and industry officials with assistance and guidance in their plans for environmental protection. The maps reduce the potential for conflict by depicting areas or resources that are ecologically or economically valuable and that could be most vulnerable to the construction and operation of energy facilities.

81/31 OLSON, J. E., E. A. WHIPPO, AND G. C. HORAK. 1981. Reach File Phase II Report: a standardized method for classifying status and type of fisheries. n.p.

The Reach File is a computerized catalog of the hydrological features of the United States. The file will organize and analyze water resources data and provide interpreted information concerning physical, chemical, and biological attributes of the cataloged river reaches. The objective of Phase II was to design a standardized system for collecting information related to the type and quality of fisheries in the cataloged reaches.

81/32 SHEW, D. M., ET AL. 1981. Texas Barrier Islands region ecological characterizations: environmental synthesis papers. 413 pp.

This report is a synthesis of selected environmental literature for the Texas Barrier Islands Region and is a part of the Texas Barrier Islands Region Ecological Characterization Study. The Texas Barrier Islands Region is defined to include the coastal counties and extends 64 km inland and offshore to the State–Federal demarcation. These papers deal with six drainage basins along the Texas coast, and address the geology, climate, hydrology and hydrography, and the biology of each basin.

81/33 WHELAN, J. B., ET AL. 1981. Biological and economic impact of stream alteration in the Virginia Piedmont. 46 pp.

This study was designed to determine the effects of stream channelization on the aquatic/riparian fish and wildlife resources of selected warmwater streams in the Virginia Piedmont. Changing land-use patterns and the economic costs and benefits of the channelization projects were also analyzed. Variations in fish and bird species diversity among channelized and unchannelized streams was discussed.

81/34 SOHOLT, L., AND S. WIEDENBAUM. 1981. Oil shale: its development and potential for air quality effects. 62 pp.

The development of western oil shales is expected to expand dramatically over the next several decades in order to provide sources of liquid fuels as alternatives to conventional petroleum. This document provides the biologist an overview of the oil shale extraction and processing, the regulatory context, the sources and nature of atmospheric emissions, and the potential toxicity of oil shale emissions.

81/35 [Not issued]

81/36 FRITTS, T. H., AND R. P. REYNOLDS. 1981. Pilot study of the marine mammals, birds, and turtles in OCS areas of the Gulf of Mexico. 150 pp.

The report discusses techniques for collecting data on marine animals in OCS areas. Aerial surveys of mammals, birds, and turtles were conducted in four study sites in the Gulf of Mexico, at altitudes of 91 and 228 m, in August and December 1979. Weather and physical factors, altitude, distance, depth, observer bias, species, and species group size are analyzed as potential sources of error in aerial surveys.

81/37 WHARTON, C. H., ET AL. 1982. The ecology of bottomland hardwood swamps of the Southeast: a community profile. 133 pp.

This report synthesizes extant literature detailing the ecology of bottomland hardwoods in the floodplains of rivers whose drainages originate in the Appalachian Mountains/Piedmont and Coastal Plain (North Carolina, South Carolina, Georgia, and Florida). The origin and dynamics of the floodplains are described and related to hydrology and physiographic provinces. Plant and animal community structure and ecological processes (productivity) are described and organized by ecological zones.

81/38 GILBERT, T., T. KING, AND B. BARNETT. 1981. An assessment of wetland habitat establishment at a central Florida phosphate mine site. 111 pp.

This study was conducted to assess feasibility of reclaiming wetland habitats to partially mitigate long-term adverse impacts on fish and wildlife populations of phosphate mining. Current reclamation practices do not

restore habitat values and regional habitat diversity associated with pre-mining native environments.

81/39.1 to 81/39.3 These reports synthesize existing literature and survey data for birds in several States. Their objectives are to summarize available bird population data for major habitat types, to indicate how changes in habitat influence population trends, and to suggest techniques for managing bird diversity and abundance in various habitat types.

81/39.1 ANDERSON, S. H., C. S. ROBBINS, AND J. R. PARTELOW. 1981. Habitat management for birds of Pennsylvania. 52 pp.

81/39.2 ANDERSON, S. H., C. S. ROBBINS, AND J. R. PARTELOW. 1981. Habitat management for birds of West Virginia. 49 pp.

81/39.3 ANDERSON, S. H., C. S. ROBBINS, AND J. R. PARTELOW. 1981. Habitat management for birds of Alabama. 58 pp.

81/40 [Not issued]

81/41 FRIEND, J. H., ET AL. 1982. Alabama coastal region ecological characterization. Vol. 3, a socioeconomic study. 367 pp.

The socioeconomic study consists of nine topics discussing the social and economic climate of coastal Alabama. These nine topics are: social and demographic characteristics; industrial and residential development; agricultural production; minerals production, commercial fishing; transportation; recreation/tourism industry; multiple use conflicts; and environmental issues and regulations. Also included is an extensive appendix containing tabular data supporting the discussions.

81/42 [Not issued]

81/43 MILHOUS, R. T., D. L. WEGNER, AND T. J. WADDLE. 1981. (Revised). User's guide to the physical habitat simulation system. 254 pp.

The manual contains instructions and guidelines for using the Physical Habitat Simulation System (PHABSIM) developed by the Instream Flow Group, USFWS. The PHABSIM system simulates the physical habitat in relation to flow regime and physical structure of a stream and has been applied to water management and fisheries management. The manual contains specific descriptions of the theory and organization of the computer programs making up PHABSIM. Appendix material contains directions for use of particular programs or for specialized applications of the programs.

81/44 CH_2M HILL. 1981. Feasibility of using geothermal effluents for waterfowl wetlands. 236 pp.

The feasibility of using geothermal effluent water to develop and maintain waterfowl wetlands was evaluated. The study area encompassed Idaho, Montana, Nevada, New Mexico, northern California, Oregon, and Utah. Physical and chemical properties of effluent water were described for 206 sites in the 7 States. Potential use of the sites for wetlands was evaluated. Sites with the most development potential are in the Beaverhead area, the Camas area of Idaho, and the Nye area of Nevada.

81/45 OHLSSON, K. E., ET AL. 1982. Best current practices for fish and wildlife on surface-mined land in the northern Appalachian coal region. 305 pp.

This document was developed to aid surface coal mine operators in identifying and implementing the best current practices (BCP's) for protecting and improving fish and wildlife resources on their minesite during both the active coal extraction and post-mining phases of their operation. Information about best current practices was identified then compiled and presented in a form compatible with the needs of the operators so that they can directly incorporate the procedures into their mining and reclamation activities.

81/46 GRENNEY, W. J., AND A. KRASZEWSKI. 1981. Description and application of the stream simulation and assessment version IV (SSAM IV). v.p.

The purpose of this report is to describe the mathematical model, the Stream Simulation and Assessment Model (SSA), used to introduce water quality aspects into the Instream Flow Group's Incremental Methodology (IFIM). This document is intended for use by aquatic biologists and water quality engineers who are experienced in water quality studies, and who need a water quality computer model.

81/47 HAYS, R. L., C. SUMMERS, AND W. SEITZ. 1981. Estimating wildlife habitat variables. 111 pp.

Thirty-five techniques for estimating variables commonly used as input to habitat models for terrestrial wildlife species are described. Each description includes explicit directions for use, and information about required equipment, cost to apply, accuracy, and conditions under which it is appropriate to be used. A glossary of variables is included,

and cross-referenced to the appropriate techniques.

81/48 SIMONS, D. B., ET AL. 1981. Proceedings: workshop on downstream river channel changes resulting from diversions or reservoir construction. 353 pp.

This workshop assembled 20 qualified individuals to discuss solutions to downstream problems stemming from hypothetical impoundments or diversions, or both, on three selected rivers in the West. The proceedings of the workshop are composed of results prepared by the 20 participants along with reporters' comments and workshop summaries. These reports describe how the authors perceive the problem of river response and determine a solution to a set of hypothetical man-induced changes.

81/49 NESBITT, S. A., ET AL. 1982. Florida atlas of breeding sites for herons and their allies: 1976–78. 455 pp.

The first atlas of heron colonies was published in 1978 (Osborn and Custer 1978) and covered the Atlantic coast from Maine to Florida for 1975 and 1976. This atlas is an update of heron colonies for the Atlantic coast of Florida and an initial heron colony coverage for the Florida gulf coast and inland colonies, 1976 through 1978. Aerial surveys were conducted in April and midsummer over the Florida peninsula, east of the Ochlockonee River. A total of 295 active nesting colonies, with 22 different species, were located in the 3-year period.

81/50 MCCOY, E. D. 1981. Rare, threatened, and endangered plant species of southwest Florida and potential OCS activity impacts. 93 pp.

This report on rare, threatened, and endangered plants of southwest Florida is a compilation of all species so designated or considered for listing by Federal, State, and private agencies or organizations. The most serious potential affects of Outer Continental Shelf (OCS) oil development activities on plants would result from oil spills. Under certain unfavorable conditions, offshore spills could adversely affect concentrations of coastal plants in predicted landfall areas.

81/51 BENSON, N. G., EDITOR. 1982. Life history requirements of selected finfish and shellfish in Mississippi sound and adjacent areas. 104 pp.

The published and unpublished literature on spawning, nursery, and migratory requirements of 41 finfish and shellfish species in Mississippi Sound, Mobile Bay and adjacent waters was synthesized to assist the U.S. Army Corps of Engineers in planning dredging activities for navigation. Species were selected because of high abundance or significant value for recreational or commercial fishing.

81/52 WARD, G. H., JR. 1980. Matagorda Bay, Texas: its hydrography, ecology, and fishery resources. 230 pp.

This is the final report for Phase I of a projected 3-year study of Matagorda Bay. It is a compilation and synthesis of available information on the hydrography and ecology of the Matagorda Bay system. Further information needs are also discussed.

81/53 [Not issued]

81/54 ZEDLER, J. B. 1982. The ecology of southern California coastal salt marshes: a community profile. 110 pp.

Southern California coastal wetlands are small and disturbed. Management problems include continuing development, reduced tidal circulation, depauperate species lists, and the need to create marsh communities on newly exposed substrates. The constraints of hypersaline soils, scarce sources of propagules, and poor establishment ability of southern California halophytes make marsh enhancement a slow and difficult process.

81/55 NIXON, S. W. 1982. The ecology of the New England high salt marshes: a community profile. 70 pp.

High marshes have been subjected to man's activities since earliest English settlement. The history of New Englanders' impact on this community is traced from their use of marshes as hay fields to depositories of pollutants. Habitat management considerations today include mosquito control and sewage sludge treatment.

82/01 CLAPP, R. B., ET AL. 1982. Marine birds of the southeastern United States and Gulf of Mexico. Part 1, Gaviiformes through Pelecaniformes. 637 pp.

This report describes the distribution, abundance, habitat, food habits and other aspects of the life history, and susceptability of oil, to 39 species of marine birds of the order Gaviiformes, Podicipediformes, Procellariiformes, or Pelecaniformes in the southeastern Atlantic and Gulf of Mexico. Winter distribution maps for the more common species and breeding range maps for the species that nest in the coastal southeastern U.S. and in the Gulf are presented. An

extensive, chronological bibliography accompanies each species account.

82/02 LONGLEY, W. L., R. JACKSON, AND B. SNYDER. 1982. Managing oil and gas activities in coastal environments: comprehensive report. 839 pp.

This report documents the management of oil and gas development on wildlife refuges along the Louisiana and Texas coasts. Guidelines, standards, and stipulations imposed on development activities in these areas are analyzed. Methods for determining environment impacts are also described.

82/03 WOOLFENDEN, G. E., 1983. Rare, threatened, and endangered vertebrates of southwest Florida and potential OCS activity impacts. 64 pp.

Habitat preferenes of 68 rare, threatened, or endangered vertebrate species are described, along with information on species distribution, reproduction, feeding, and population estimates. Outer Continental Shelf (OCS) development activities contributing to the decline of these 68 vertebrates are assessed; loss of usable habitat is considered to be the most significant problem.

82/04 SHARITZ, R. R., AND J. W. GIBBONS. 1982. The ecology of southeastern shrub bogs (pocosins) and Carolina bays: a community profile. 93 pp.

This describes the ecology of pocosins and Carolina bays, including information on geology, soils, floral and faunal species composition, and other attributes. Impacts of land use changes on these bogs and bays (e.g., forestry and agricultural clearage), are also discussed.

82/05 LIVINGSTON, R. J. 1984. The ecology of the Apalachicola Bay system: an estuarine profile. 150 pp.

Twelve years of studies in the Apalachicola Bay system are reviewed. Included are data on geography, hydrology, chemistry, geology, and biology.

82/06 COPELAND, B. J., R. G. HODSON, AND S. R. RIGGS. 1984. Ecology of Pamilico River estuary: estuarine profile. 83 pp.

The Pamilico River estuary in eastern North Carolina serves as an important nursery ground for a number of migratory fish species as well as shrimp and blue crabs. It is a major tributary to Pamilico Sound, the primary estuarine fishing ground of the State. Impacts of large-scale drainage activities and nutrient inputs on this fishery are among the issues facing managers of the estuary's resources.

82/07 [Not issued]

82/08 JAAP, W. C. 1984. The ecology of the South Florida coral reefs: a community profile. 138 pp.

An overview of coral reef research in southern Florida is provided as a preclude to a genuine description of the coral reef ecosystem in the Florida Keys and surrounding environments. Coral reef community types, reef benthos, plankton and reef fish are given specific treatment. Coral reef ecology and management are described.

82/09 BAILEY, R. T., AND C. T. CUSHWA, COMPILERS. 1982. Ecoregion, land-surface form, and hydrologic unit maps of the U.S. 3 maps.

Maps included are: "Ecoregions and land-surface forms of the United States," "Hydrologic Unit Map of the United States," and "Hydrologic Unit Map of Alaska and Hawaii."

82/10, 82/10.A, 82/10.1 to 82/10.62 This is a series of publications describing habitat requirements of selected fish and wildlife species. Numerous literature sources have been consulted in an effort to consolidate scientific data on species-habitat relationships. These data have subsequently been synthesized into subjective Habitat Suitability Index (HSI) models. The models are based on suitability indices formulated for variables found to affect the life cycle and survival of each species. The models are designed to be modified to evaluate specific habitat alterations using the HSI model building techniques presented in the U.S. Fish and Wildlife Service's Habitat Evaluation Procedures.

82/10 SCHAMBERGER, M. L., A. H. FARMER, AND J. W. TERRELL. 1982. Habitat Suitability Index models: introduction. 2 pp.

82/10.A TERRELL, J. W., ET AL. 1982. Habitat Suitability Index models: Appendix A. Guidelines for riverine and lacustrine applications of fish HSI models with the habitat evaluation procedures. 54 pp.

82/10.1 BAIN, M. B., AND J. L. BAIN. 1982. Habitat Suitability Index models: coastal stocks of striped bass. 29 pp.

82/10.2 MCMAHON, T. E., AND J. W. TERRELL. 1982. Habitat Suitability Index models: channel catfish. 29 pp.

82/10.3A MCCONNELL, W. J., E. P. BERGERSEN, AND K. L. WILLIAMSON. 1984. Habitat Suitability Index models: a low effort system for

predicting habitat suitability of planned coolwater and coldwater reservoirs (revised). 47 pp.

A technique is described for measuring reservoir habitat suitability based on a composite score for five primary reservoir attributes (temperature, turbidity, nonliving cover, drawdown, and shallow cover frequency). The value of each primary attribute is determined from secondary attributes, which are easily obtained from published data or on-site inspection of the proposed reservoir basin. Subsequently, the use of primary attribute scores to determine reservoir habitat suitability for five selected fish species is described. The intended use is during the early planning stages of reservoir construction projects, when the outcomes of alternative plans are being evaluated.

82/10.4 McMAHON, T. E. 1982. Habitat Suitability Index models: creek chub. 23 pp.

82/10.5 HICKMAN, T. J., AND R. F. RALEIGH. 1982. Habitat Suitability Index models: cutthroat trout. 38 pp.

82/10.6 EDWARDS, E. A., ET AL. 1982. Habitat Suitability Index models: black crappie. 25 pp.

82/10.7 EDWARDS, E. A., ET AL. 1982. Habitat Suitability Index models: white crappie. 22 pp.

82/10.8 STUBER, R. J., G. GEBHART, AND O. E. MAUGHAN. 1982. Habitat Suitability Index models: bluegill. 26 pp.

82/10.9 EDWARDS, E. A., M. BACTELLER, AND O. E. MAUGHAN. 1982. Habitat Suitability Index models: slough darter. 13 pp.

82/10.10 JASIKOFF, T. M. 1982. Habitat Suitability Index models: ferruginous hawk. 18 pp.

82/10.11 ALLEN, A. W. 1982. Habitat Suitability Index models: pine marten. 9 pp.

82/10.12 EDWARDS, E. A., AND K. TWOMEY. 1982. Habitat Suitability Index models: common carp. 27 pp.

82/10.13 EDWARDS, E. A., AND K. TWOMEY. 1982. Habitat Suitability Index models: smallmouth buffalo. 28 pp.

82/10.14 STUBER, R. J. 1982. Habitat Suitability Index models: black bullhead. 25 pp.

82/10.15 STUBER, R. J. 1982. Habitat Suitability Index models: green sunfish. 28 pp.

82/10.16 STUBER, R. J., G. GEBHART, AND O. E. MAUGHAN. 1986. Habitat Suitability Index models: largemouth bass. 32 pp.

82/10.17 INSKIP, P. D. 1982. Habitat Suitability Index models: northern pike. 40 pp.

82/10.18 ALLEN, A. W. 1982. Habitat Suitability Index models: fox squirrel. 11 pp.

82/10.19 ALLEN, A. W. 1982. Habitat Suitability Index models: gray squirrel. 11 pp.

82/10.20 STICKNEY, R. R., AND M. L. CUENCO. 1982. Habitat Suitability Index models: juvenile spot. 12 pp.

82/10.21 DIZA, R. J. 1982. Habitat Suitability Index models: juvenile Atlantic croaker. 22 pp.

82/10.22 SOUSA, P. J. 1982. Habitat Suitability Index models: veery. 12 pp.

82/10.23 CHRISTMANS, J. Y. 1982. Habitat Suitability Index models: gulf menhaden. 23 pp.

82/10.24 RALEIGH, R. F. 1982. Habitat Suitability Index models: brook trout. 42 pp.

82/10.25 AGGUS, L. R., AND W. M. BIVIN. 1982. Habitat Suitability Index models: regression models based on harvest of coolwater and coldwater fishes in reservoirs. 38 pp.

This report presents methods designed to permit habitat classification of reservoirs that contain coolwater, coldwater, and seasonal two-story fisheries. Multiple regression equations describing relations between reservoir environmental characteristics and biomass harvest of selected sport fish species or groups are presented. Cumulative frequency plots of known harvest estimates from the various classes of reservoirs are presented to facilitate conversion of harvest predictions to Habitat Suitability Indexes (HSI's). Detailed descriptions and limitations of the procedures are discussed.

82/10.26 SCHROEDER, R. L. 1982. Habitat Suitability Index models: yellow-headed blackbird. 11 pp.

82/10.27 SCHROEDER, R. L. 1982. Habitat Suitability Index models: yellow warbler. 7 pp.

82/10.28 SCHROEDER, R. L. 1982. Habitat Suitability Index models: pine warbler. 7 pp.

82/10.29 SCHROEDER, R. L., AND P. J. SOUSA. 1982. Habitat Suitability Index models: eastern meadowlark. 9 pp.

82/10.30 ALLEN, A. W. 1983. Habitat Suitability Index models: beaver. (Revised) 19 pp.

82/10.31 SIKORA, W. B., AND J. P. SIKORA. 1982. Habitat Suitability Index models: southern kingfish. 22 pp.

82/10.32 SOUSA, P. J. 1983. Habitat Suitability Index models: Lewis' woodpecker. 14 pp.

82/10.33 EDWARDS, E. A. 1983. Habitat Suitability Index models: longnose dace. 13 pp.

82/10.34 EDWARDS, E. A. 1983. Habitat Suitability Index models: bigmouth buffalo. 23 pp.

82/10.35 EDWARDS, E. A. 1983. Habitat Suitability Index models: longnose sucker. 21 pp.

82/10.36 EDWARDS, E. A., G. GEBHART, AND O. E. MAUGHAN. 1983. Habitat Suitability Index models: smallmouth bass. 47 pp.

82/10.37 SCHROEDER, R. L. 1983. Habitat Suitability Index models: black-capped chickadee. 12 pp.

82/10.38 SCHROEDER, R. L. 1983. Habitat Suitability Index models: downy woodpecker. 10 pp.

82/10.39 SCHROEDER, R. L. 1983. Habitat Suitability Index models: pileated woodpecker. 15 pp.

82/10.40 TRIAL, J. G., ET AL. 1983. Habitat Suitability Index models: common shiner. 22 pp.

82/10.41 TRIAL, J. G., ET AL. 1983. Habitat Suitability Index models: blacknose dace. 26 pp.

82/10.42 ALLEN, A. W. 1983. Habitat Suitability Index models: southern red-backed vole (western United States). 14 pp.

82/10.43 SOUSA, P. J., AND A. H. FARMER. 1983. Habitat Suitability Index models: wood duck. 27 pp.

82/10.44 SOUSA, P. J., AND W. N. MCDONAL. 1983. Habitat Suitability Index models: Baird's sparrow. 12 pp.

82/10.45 ALLEN, A. W. 1983. Habitat Suitability Index models: fisher. 19 pp.

82/10.46 ALLEN, A. W. 1984. Habitat Suitability Index models: muskrat. 27 pp.

82/10.47 SOUSA, P. J. 1983. Habitat Suitability Index models: Williamson's sapsucker. 13 pp.

82/10.48 TRIAL, J. G. 1983. Habitat Suitability Index models: fallfish. 15 pp.

82/10.49 MCMAHON, T. E. 1983. Habitat Suitability Index models: coho salmon. 29 pp.

82/10.50 LEWIS, J. C. 1983. Habitat Suitability Index models: roseate spoonbill. 16 pp.

82/10.51 LEWIS, J. C. 1983. Habitat Suitability Index models: clapper rail. 15 pp.

82/10.52 RORABAUGH, J. C., AND P. J. ZWANK. 1983. Habitat Suitability Index models: mottled duck. 26 pp.

82/10.53 HOWARD, R. J., AND H. A. KANTRUD. 1983. Habitat Suitability Index models: redhead (wintering). 14 pp.

82/10.54 TURNER, R. E., AND M. S. BRODY. 1983. Habitat Suitability Index models: Northern Gulf of Mexico brown shrimp and white shrimp. 24 pp.

82/10.55 KRIEGER, D. A., J. W. TERRELL, AND P. C. NELSON. 1983. Habitat Suitability Index models: yellow perch. 37 pp.

82/10.56 MCMAHON, T. E., J. W. TERRELL, AND P. C. NELSON. 1984. Habitat Suitability Index models: walleye. 43 pp.

82/10.57 CAKE, E. W., JR. 1983. Habitat Suitability Index models: Gulf of Mexico American oyster. 37 pp.

82/10.58 PARDUE, G. B. 1983. Habitat Suitability Index models: alewife and blueback herring. 22 pp.

82/10.59 RODNICK, K., AND H. W. LI. 1983. Habitat Suitability Index models: littleneck clam. 15 pp.

82/10.60 RALEIGH, R. F., ET AL. 1984. Habitat Suitability Index models: rainbow trout. 63 pp.

82/10.61 ALLEN, A. W. 1983. Habitat Suitability Index models: mink. 19 pp.

82/10.62 SOUSA, P. J. 1983. Habitat Suitability Index models: field sparrow. 14 pp.

82/10.63 SCHROEDER, R. L. 1984. Habitat Suitability Index models: black brant. 11 pp.

82/10.64 TWOMEY, K. A., K. L. WILLIAMSON, AND P. C. NELSON. 1984. Habitat Suitability Index models and Instream Flow Suitability curves: white sucker. 56 pp.

82/10.65 ALLEN, A. W., J. G. COOK, AND M. J. ARMBRUSTER. 1984. Habitat Suitability Index models: pronghorn. 22 pp.

82/10.66 ALLEN, A. W. 1984. Habitat Suitability Index models: eastern cottontail. 28 pp.

82/10.67 MCMAHON, T. E., G. GEBHART, AND O. E. MAUGHAN. 1984. Habitat Suitability Index models: warmouth. 20 pp.

82/10.68 LEWIS, J. C., AND R. L. GARRISON. 1984. Habitat Suitability Index models: black duck. 16 pp.

82/10.69 SHORT, H. L. 1984. Habitat Suitability Index models: western grebe. 20 pp.

82/10.70 SHORT, H. L. 1984. Habitat Suitability Index models: the Arizona guild and layers of habitat models. 36 pp.

82/10.71 RALEIGH, R. F., L. D. ZUCKERMAN, AND P. C. NELSON. 1984. Habitat Suitability Index models and Instream Flow Suitability curves: brown trout. 71 pp.

82/10.72 McMahon, T., G. Gebhart, D. E. Maughan, and P. C. Nelson. 1984. Habitat Suitability Index models and Instream Flow Suitability curves: spotted bass. 41 pp.

82/10.73 [Not issued]

82/10.74 Buckley, J. 1984. Habitat Suitability Index models: larval and juvenile red drum. 15 pp.

82/10.75 Kostecki, P. T. 1984. Habitat Suitability Index models: spotted seatrout. 22 pp.

82/10.76 Mulholland, R. 1984. Habitat Suitability Index models: pink shrimp. 17 pp.

82/10.77 Mulholland, R. 1984. Habitat Suitability Index models: hard clam. 21 pp.

82/10.78 Chapman, B. R., and R. J. Howard. 1984. Habitat Suitability Index models: great egret. 23 pp.

82/10.79 Twomey, K. A., and P. C. Nelson. 1984. Habitat Suitability Index models and Instream Flow Suitability curves: redear sunfish. 29 pp.

82/10.80 Hubert, W. A., S. H. Anderson, P. D. Southall, and J. H. Crance. 1984. Habitat Suitability Index models and Instream Flow Suitability curves: paddlefish. 32 pp.

82/10.81 Schroeder, R. L. 1984. Habitat Suitability Index models: blue grouse. 20 pp.

82/10.82 Schroeder, R. L. 1984. Habitat Suitability Index models: canvasback. 16 pp.

82/10.83 Short, H. L. 1984. Habitat Suitability Index models: Brewer's sparrow. 16 pp.

82/10.84 Marcus, M. D., W. A. Hubert, and S. H. Anderson. 1984. Habitat Suitability Index models: lake trout. 12 pp.

82/10.85 McMahon, T. E., G. Gebhart, O. E. Maughan, and P. C. Nelson. 1984. Habitat Suitability Index models: striped bass. 41 pp.

82/11.1 to 82/11.21 This series is entitled "Species profiles: life histories and environmental requirements of coastal fishes and invertebrates." It contains summaries of the life histories and environmental requirements of selected coastal fishes and invertebrates of commercial, recreational, or ecological significance. The profiles will be used to relate life history and environmental requirements of species to coastal water quality models and to assist in evaluating the environmental impacts of altering estuarine habitats. These studies were conducted in cooperation with the U.S. Army Corps of Engineers.

82/11.1 Lassuy, D. R. 1983. Species profiles: life histories and environmental requirements (Gulf of Mexico): brown shrimp. 15 pp.

82/11.2 Lassuy, D. R. 1983. Species profiles: life histories and environmental requirements (Gulf of Mexico): Gulf menhaden. 13 pp.

82/11.3 Lassuy, D. R. 1983. Species profiles: life histories and environmental requirements (Gulf of Mexico): Atlantic croaker. 12 pp.

82/11.4 Lassuy, D. R. 1983. Species profiles: life histories and environmental requirements (Gulf of Mexico): spotted seatrout. 14 pp.

82/11.5 Muncy, R. J., and W. M. Wingo. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Gulf of Mexico): sea catfish and gafftopsail catfish. 17 pp.

82/11.6 Beauchamp, D. A., M. F. Shepard, and G. B. Pauley. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Northwest): chinook salmon. 15 pp.

82/11.7 Stanley, J. G., and D. S. Danie. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North Atlantic): white perch. 12 pp.

82/11.8 Fay, C. W., R. J. Neves, and G. B. Pardue. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (mid-Atlantic): striped bass. 36 pp.

82/11.9 Fay, C. W., R. J. Neves, and G. B. Pardue. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (mid-Atlantic): alewife/blueback herring. 25 pp.

82/11.10 Fay, C. W., R. J. Neves, and G. B. Pardue. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (mid-Atlantic): Atlantic silverside. 15 pp.

82/11.11 Rogers, S. G., and M. J. Van Den Avyle. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (south Atlantic): Atlantic menhaden. 20 pp.

82/11.12 Fay, C. W., R. J. Neves, and G. B. Pardue. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (mid-Atlantic): bay scallop. 17 pp.

82/11.13 Fay, C. W., R. J. Neves, and G. B. Pardue. 1983. Species profiles: life histories and

environmental requirements of coastal fishes and invertebrates (mid-Atlantic): surf clam. 23 pp.

82/11.14 ROBINETTE, H. R. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Gulf of Mexico): bay anchovy and striped anchovy. 15 pp.

82/11.15 ROGERS, S. G., AND M. J. VAN DEN AVYLE. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (South Atlantic): summer flounder. 14 pp.

82/11.16 SEAMAN, W., JR., AND M. COLLINS. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (South Florida): snook. 16 pp.

82/11.17 BIELSA, L. M., W. H. MURDICH, AND R. F. LABISKY. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (South Florida): pink shrimp. 20 pp.

82/11.18 STANLEY, J. G., AND R. DEWITT. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North Atlantic): hard clam. 19 pp.

82/11.19 VAN DEN AVYLE, M. J., AND D. L. FOWLER. 1984. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (South Atlantic): blue crab. 16 pp.

82/11.20 MUNCY, R. J. 1984. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Gulf of Mexico): white shrimp.

82/11.21 LINDBERG, W. J., AND M. J. MARSHALL. 1984. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (South Florida): stone crab. 17 pp.

82/11.22 DANIE, D. S., J. G. TRIAL, AND J. G. STANLEY. 1984. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North Atlantic): Atlantic salmon. 19 pp.

82/11.23 SELLERS, M. A., AND J. G. STANLEY. 1984. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North Atlantic): American oyster. 15 pp.

82/11.24 VAN DEN AVYLE, M. J. 1984. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (South Atlantic): American eel. 20 pp.

82/11.25 VAN DEN AVYLE, M. J. 1984. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (South Atlantic): Atlantic sturgeon. 17 pp.

82/11.26 MUNCY, R. J. 1984. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Gulf of Mexico): pinfish. 18 pp.

82/11.27 MUNCY, R. J. 1984. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (South Atlantic): white shrimp. 19 pp.

82/12 JONES, B., AND N. G. BENSON. 1982. User's guide to coastal fish: a computerized database on finfish and shellfish. MS/ALG version 1: Mississippi Sound and Mobile Bay. 133 pp.

This database includes information on 41 species of finfish and shellfish in Mississippi Sound and Mobile Bay (Mississippi and Alabama). It was prepared to assist in environmental planning. Particularly planning related to placement of dredge spoil materials.

82/13.1 to 82/13.3 The three publications in this series discuss water intake structures and their effects on aquatic ecosystems, including entrainment and impingement.

82/13.1 NEITZEL, D. A., AND D. H. MCKENZIE. 1982. Procedure for developing biological input for the design, location, or modification of water intake structures. 83 pp.

82/13.2 SIMMONS, M. A., AND D. H. MCKENZIE. 1982. Evaluation of models for developing biological input for the design and location of water intake structures. 28 pp.

82/13.3 NEITZEL, D. A., M. A. SIMMONS, AND D. H. MCKENZIE. 1982. A guidance manual for the input of biological information to water intake structure design. 37 pp.

82/14 [Not issued]

82/15 to 82/17 These reports present descriptive explanations of data presented on 16 maps (maps not available from NTIS) produced at a scale of 1:100,000 for the Texas Barrier Islands region from the eastern end of East Bay, Chambers County, Texas, to the Texas-Mexico border. Socioeconomic and natural features and mineral, oil, gas, and biological resources are included.

82/15 KIMBER, C. T., K. L. WHITE, AND F. S. HENDRICKS. 1984. Texas barrier islands regional atlas: socioeconomic and natural features narrative. 73 pp.

82/16 JOHNSON, J. B., COMPILER. 1984. Texas barrier island region ecological characterization atlas: biological resources narrative. 12 pp.

82/17 KIMBER, C. T., K. L. WHITE, AND F. S. HENDRICKS. 1984. Texas barrier island region ecological characterization atlas: mineral resources and selected oil and gas infrastructures narrative. 85 pp.

82/18 HYNSON, J., ET AL. 1982. Handbook for protection of fish and wildlife from construction of farm and forest roads: best management practices for building activities associated with the discharge of dredged or fill material. 185 pp.

This handbook describes 54 best management practices which may be utilized by Federal and States agencies or private landowners and operators in the planning, construction, and maintenance of farm and forest roads. Best management practices (BMP's) for planning road and facility layout and design, erosion control, construction and maintenance operations, and restorations to natural conditions, identified through existing State water quality management plans and management practices of Federal agencies, were evaluated as to their environmental, institutional, technical, and economical effectiveness.

82/19 [Not issued]

82/20 CLAPP, R. B., D. MORGAN-JACOBS, AND R. C. BANKS. 1982. Marine birds of the southeastern United States and Gulf of Mexico. Part II, Anseriformes. 504 pp.

This report describes the distribution, abundance, habitat, food habits and other aspects of the life history, and susceptibility to oil of 41 species of waterfowl of the order Anseriformes in the southeastern Atlantic and Gulf of Mexico. Winter distribution maps for the more common species are presented. An extensive, chronological bibliography accompanies each species account. The report is a planning tool for Federal and State agencies and private companies dealing with oil impacts in coastal waters.

82/21 O'NEIL, P. E., ET AL. 1982. Alabama coastal region ecological characterization. Vol. I, coastal bibliography. 408 pp.

The primary goal of the Coastal Bibliography is to provide a comprehensive data base to potential users of Alabama's coastal areas and resources. The bibliography is comprised of published and unpublished studies that describe the socioeconomic structure and environmental setting of coastal Alabama. Bibliographic data were organized into a standardized format and indexed by keywords. These data were placed on computer tape and are managed using a computer-base information storage and retrieval system known as FAMULUS. Bibliographic entries may be retrieved by author and keywords.

82/22 LEE, L. C., R. O. TESKEY, AND T. M. HINCKLEY. 1982. Impact of water level changes on woody riparian and wetland communities. Vol. IX, Alaska. 212 pp.

This literature review synthesizes information on the effects of water level changes on riparian and wetland plants in Alaska. Unlike other volumes in this series, this report contains information not only on woody plants, but also on perennial graminoids and other herbaceous species common to Alaskan wetlands. As in other volumes, information is included on species tolerance to inundation. Other parameters regulating growth are also discussed, including: cold temperatures; oxygen demand; and nitrogen requirements. *See also* series abstract on p. 20.

82/23 CHAPMAN, R. J., ET AL. 1982. Impact of water level changes on woody riparian and wetland communities. Vol. X, index and addendum to Vol. I–VIII. 111 pp.

This report provides the user with a summary and a general reference document for Vols. I–X of the Fish and Wildlife Service series on Impact of Water Level Changes on Woody Riparian and Wetland Communities. (*See* series abstract on p. 20.) This index provides the reader with a summary of the earlier volumes, a list of new literature, excerpts of pertinent recent findings, and a list of errors in preceding volumes.

82/24 SIMPSON, P. W., ET AL. 1982. Manual of stream alteration impacts on fish and wildlife. 166 pp.

This manual contains a synthesis of the diverse literature dealing with the effects of stream channelization on fish and wildlife resources. Major topics include: (1) regulatory history of stream channelization; (2) structural, physical, and chemical impacts of channelization; and (3) biological impacts of channelization.

82/25 ZIEMAN, J. C. 1982. The ecology of the seagrasses of South Florida: a community profile. 150 pp.

A detailed description is given of the community structure and processes of the seagrass ecosystems of south Florida. This description is based upon a compilation of

information from numerous published and unpublished sources. The material covered includes distribution, systematics, physiology, and growth of the plants, as well as succession and community development. Emphasis is given to the functional role of seagrass communities in the overall coastal marine system.

82/26 BOVEE, K. D. 1982. A guide to stream habitat analysis using the Instream Flow Incremental Methodology. IFIP No. 12. 248 pp.

This manuscript consists of two parts. Part I describes the methodological design, project scoping and site selection procedures, analytical sequences to solve various instream flow and project impact problems, and the various techniques for compiling, displaying, and interpreting the results of a study. Part II contains techniques for assembling hydrological data and anticipating channel changes due to a change in flow regime or sediment yield, methods of simulating physical microhabitat conditions at different streamflows, and an overview of channel modifications to increase habitat availability.

82/27 GALLAWAY, B. J., AND G. S. LEWBEL. 1982. The ecology of petroleum platforms in the northwestern Gulf of Mexico: a community profile. 91 pp.

This coastal habitat profile describes the structure and ecological function of petroleum platforms in the northwestern Gulf of Mexico. The effects of discharges from active platforms on the ecosystem are described.

82/28 [Not issued]

82/29 FULBRIGHT, T. E., E. F. REDENTE, AND N. E. HARGIS. 1982. Growing Colorado plants from seed: a state-of-the-art. Vol. II, grasses and grasslike plants. 113 pp.

This report summarizes published information concerning seed procurement, pretreatment, laboratory germination and cultural practices for growing native and naturalized species of grass in Colorado. Also included are literature citations, a list of Colorado grasses that have been evaluated by the USDA Soil Conservation Service Plant Materials Centers, a list of varieties and cultivars released by the plant materials centers, and addresses of plant materials centers in the West. (Vol. III is *FWS/OBS*-82/30. Vol. I was published by the U.S. Forest Service.)

82/30 REDENTE, E. F., P. R. OGLE, AND N. E. HARGIS. 1982. Growing Colorado plants from seed: a state-of-the-art. Vol. III, forbs. 141 pp.

This report summarizes published information concerning seed procurement, pretreatment, laboratory germination, and cultural practices for growing 442 native and naturalized forb species in Colorado. Also included are 199 literature citations, a list of Colorado forbs that have been evaluated by USDA Soil Conservation Service Plant Materials Centers, and addresses of plant materials centers in the West. (Vol. II is *FWS/OBS*-82/29. Vol. I was published by the U.S. Forest Service.)

82/31 KANTRUD, H. A. 1982. Maps of distribution and abundance of selected species of birds on uncultivated native upland grasslands and shrubsteppe in the Northern Great Plains. 31 pp.

Recent information on areas of abundance of some important species of avifauna which use grasslands is included in this report. The study area includes portions of Montana, Wyoming, Colorado, North Dakota, South Dakota, and Nebraska. Twenty distribution maps for individual species are included.

82/32 SELISKAR, D. M., AND J. L. GALLAGHER. 1983. The ecology of tidal marshes of the Pacific Northwest coast: a community profile. 65 pp.

A conceptual model of functional groups within the tidal marshes of the Pacific Northwest, and a model depicting interactions between the marshes and adjacent ecosystems are presented.

82/33 to 82/35, 83/07, 83/18, and 83/20 to 83/22 This series of publications, focusing on selected western and midwestern States, provides a survey of State perogatives which may be used, or have been used, to protect instream uses of water. Fish and wildlife uses of instream flows are emphasized. Many of the publications also cover use of instream flows for hydroelectric power production, recreation, navigation, downstream delivery, and waste load assimilation. These reports provide overviews of potential opportunities for preserving instream flows within the context of existing State laws and regulations.

82/33 WHITE, M. R. 1982. Opportunities to protect instream flows in Alaska. 30 pp.

82/34 OLIVE, S. W. 1982. Protecting instream flows in California: an administrative case study. IFIP No. 14. 32 pp.

82/35 OLIVE, S. W. 1982. Protecting instream flows in Idaho: an administrative case study. IFIP No. 15. 30 pp.

82/36 CLUGSTON, J. P., D. H. BARWICK, AND T. T. FENDLEY. 1982. Management of cooling

ponds and lakes for fish and wildlife—a guidance manual. 68 pp.

This manual discusses management techniques for enhancing fish and wildlife communities at planned and existing cooling lakes. A special section highlights powerplant induced problems that may affect management strategies.

82/37 FRITTS, T. H., AND M. A. MCGEHEE. 1982. Effects of petroleum on the development and survival of marine turtle embryos. 41 pp.

82/38 TYUS, H. M. 1982. Fish radiotelemetry: theory and application for high conductivity rivers. 26 pp.

Theoretical and applied information about radiotelemetry related to rivers with high conductivity is presented in this report. Theoretical information is presented in a simplified form for investigators new to the radiotelemetry field. Radiotelemetry and ultrasonics are compared as methods for obtaining information about fish movements in turbulent, turbid river systems.

82/39.1 to 82/39.3 These publications describe a computer code used to simulate fast-transient, three-dimensional flow conditions in aquatic environments. This code is designed to assess entrainment and impingement losses at power plants.

82/39.1 KIM, K. H. 1982. HYDROL. Vol. I, documentation and user's manual. 111 pp.

82/39.2 KIM, K. H. 1982. HYDROL. Vol. II, flow diagrams. 252 pp.

82/39.3 KIM, K. H. 1982. HYDROL: Vol. III, computer listing, example input and output. 258 pp.

82/40.1 to 82/40.3 The computer code described in these publications is to be used to simulate fast-transient, three-dimensional flow, temperature, and salinity conditions in aquatic environments. It can assess the water quality impact of power plant operations.

82/40.1 KIM, K. H. 1982. THERMA. Vol. I, documentation and user's manual. 124 pp.

82/40.2 KIM, K. H. 1982. THERMA. Vol. II, flow diagrams. 252 pp.

82/40.3 KIM, K. H. 1982. THERMA. Vol. III, computer listing, example input and output. 315 pp.

82/41.1 to 82/41.3 These three volumes describe a computer code for simulating fast-transient, three-dimensional concentrations of biota in aquatic environments for the assessment of entrainment and impingement losses at power plants.

82/41.1 KIM, K. H. 1982. AQUBIO. Vol. I, documentation and user's manual. 123 pp.

82/41.2 KIM, K. H. 1982. AQUBIO. Vol. II, flow diagrams. 252 pp.

82/41.3 KIM, K. H. 1982. AQUBIO. Vol. III, computer listing, example input and output. 285 pp.

82/42 O'NEIL, P. E., AND M. F. METTER, EDITORS. 1982. Alabama coastal region ecological characterization. Vol. II, a synthesis of environmental data. 346 pp.

The Environmental Synthesis report consists of two parts. The first contains a detailed description of the natural environment of coastal Alabama relative to its biological, geological, and hydrological resources and processes. The second part presents a conceptual model of energy flow through major coastal ecosystems (freshwater, coastal terrestrial, estuarine, and outer continental shelf) and relates them to modified and manipulated systems (urban, industrial, and agricultural) in Mobile and Baldwin Counties.

82/43 KIM, K. H. 1982. A step-by-step implementation on the application of the HYDROL, THERMA, and AQUBIO computer codes.

This report presents a detailed description of implementation procedures for the computer codes developed, under the sponsorship of the Fish and Wildlife Service, for the simulation of hydrodynamic, thermal, saline, and biological concentration conditions for the assessment of the environmental impacts of power plants.

82/44 [Not issued]

82/45 [Not issued]

82/46 SMITH, M. F., JR. 1984. Ecological characterization atlas of coastal Alabama: map narrative. 189 pp.

This report is a descriptive explanation of data presented on 30 maps (maps not available from NTIS) produced at a scale of 1:100,000 for the coastal Alabama region—Mobile and Baldwin counties. Topics mapped include biological resources; socioeconomic features; soils; oil, gas, and mineral resources; and hydrology and climatology.

82/47 MARTEL LABORATORIES, INC., AND MANGROVE SYSTEMS, INC. 1983. Southwestern Florida ecological characterization: an ecological atlas. v.p.

This consists of a volume of map narratives and 16 base maps plus overlays which

document existing information on the biological, social, and physical characteristics of several Gulf Coastal counties of Florida. These maps and narratives are designed to aid Federal and State decision makers, and others, with coastal planning and management, and in planning for Outer Continental Shelf oil and gas development.

82/49 OFFICE OF BIOLOGICAL SERVICES. 1982. Habitat Preservation Abstracts.

Habitat Preservation Abstracts is an announcement publication intended to make the information provided by the Habitat Preservation Programs of the U.S. Fish and Wildlife Service more widely known and accessible.

82/50 [Not issued]

82/52 GOODYEAR, C. D., ET AL. 1982. Atlas of the spawning and nursery areas of Great Lake fishes.

Vol. I: A summary of geographic area. 164 pp.
Vol. II: Lake Superior. 122 pp.
Vol. III: St. Mary's River. 29 pp.
Vol. IV: Lake Michigan. 209 pp.
Vol. V: Lake Huron. 121 pp.
Vol. VI: St. Clair River. 25 pp.
Vol. VII: St. Clair Lake. 42 pp.
Vol. VIII: Detroit River. 40 pp.
Vol. IX: Lake Erie. 202 pp.
Vol. X: Niagara River. 22 pp.
Vol. XI: Lake Ontario. 117 pp.
Vol. XII: St. Lawrence River. 24 pp.
Vol. XII: Species reproduction characteristics. 153 pp.
Vol. XIV: Bibliography: 150 pp.

This atlas is a compilation of current spawning and nursery information concerning the fishes of the Great Lakes. The complete set consists of 14 volumes. The information may be used to support permit and project reviews, impact statement reviews, planning of baseline research, and identification of data gaps.

82/53 [Not issued]

82/54 [Not issued]

82/55 BECCASIO, A. D., ET AL. 1982. Gulf coast ecological inventory: user's guide and information base. 191 pp.

This study provides an inventory of important ecological resources along the Gulf coast, an area of approximately 475,000 km^2 (183,400 mi^2). It is intended to provide government and industry decision makers with valuable ecological information which will assist in the regional siting of oil and gas processing and manufacturing facilities and their respective transportation system.

82/56 WASSER, C. H. 1982. Ecology and culture of selected species useful in revegetating disturbed lands in the West. 347 pp.

Ecological information about 98 species commonly used in revegetation and reclamation projects in the western United States is included in this handbook. Each species is illustrated, and its description includes information on origin, species growth, morphological characteristics, culture, management uses and techniques, associated species, pests and diseases, and improved varieties.

82/57 ROBB, A. E., JR., AND C. E. OHLSSON. 1982. Mine-related stream alteration practices for protection and enhancement of fish and wildlife. 142 pp.

Stream alterations adverse to biological communities are identified and measures employed to mitigate and counteract these impacts are described. This is intended to provide current information on practices for protection and enhancement of fish and wildlife resources to surface mine operators and managers.

82/58.1 SCHOMER, N. S., AND R. D. DREW. 1982. An ecological characterization of the lower Everglades, Florida Bay, and the Florida Keys. 263 pp.

The study identifies four major ecological zones which are delineated by differences in basic physical-chemical factors which in turn promote characteristic ecological communities. The four zones are: (1) terrestrial and freshwater wetlands; (2) estuarine and saltwater wetlands; (3) Florida Bay and mangrove islands; and (4) the Florida keys.

82/58.2 DREW, R. D., AND N. S. SCHOMER. 1984. An ecological characterization of the Caloosahatchee River/Big Cypress watershed. 225 pp.

This report is an extensive review of the available literature on the geology, climate, hydrology, and biology of the Caloosahatchee/Big Cypress watershed in southwest Florida. The major geological, climatological, and hydrological characteristics and processes affecting the region are explained and the factors affecting water quality in the watershed are reported. Plant communities from the terrestrial freshwater, estuarine, and salt water habitats and the organisms associated with these are described.

82/59 BOESCH, D. F. 1982. Proceedings of the conference on coastal erosion and wetland

modification in Louisiana: causes, consequences, and options. 256 pp.

This volume contains 16 papers and panel discussions from a conference held in Baton Rouge, Louisiana, 5-6 October 1981. The presentations consider the causes and consequences of coastal erosion and wetland modification in Louisiana and mitigating options available to slow or reverse the rapid rate of coastal land loss.

82/60 GARCIA, J., ET AL. 1983. Energy related use conflicts for the Columbia River estuary.

Vol. I: Text. 496 pp.
Vol. II: Atlas.

Summarizes the direct and indirect effects of projected energy-related development upon fish and wildlife in estuarine and riverine systems. Cumulative impacts on particular species and habitats are integrated and described on a site-specific basis for projected development in the Columbia River Estuary.

82/61 ADAMS, J. K., K. A. BENKERT, C. KELLER, AND R. WHITE. 1984. A method for ranking biological habitats in oil spill response planning and impact assessment. 42 pp.

A method that enables oil spill response planners to minimize the ecological impacts of oil spills by determining protection priorities for biological habitats is described. The objective of the method is to allow persons responding to an oil spill to quickly identify areas that should be protected first, second, and on to the extent that personnel and equipment are available. The last section describes an application of the method to the Louisiana Offshore Oil Port (LOOP) spill response planning area.

82/62 KNAPP, W. E., B. KYNARD, AND S. T. GLOSS, EDITORS. 1982. Potential effects of Kaplan, Ossberger, and Bulb turbines on anadromous fishes of the northeastern U.S. 132 pp.

The effects of turbine passage on anadromous fishes of the northeast United States were investigated in the field and laboratory. Kaplan, Ossberger, and Bulb turbines were studied using Atlantic salmon smolts (*Salmo salar*), juvenile and adult American shad (*Alosa sapidissima*), juvenile blueback herring (*A. aestivalis*), striped bass (*Morone saxatilis*), and rainbow and steelhead trout (*S. gairdneri*). The effects of turbine size and electric power level on mortality are presented.

82/63 BAIN, M. B., J. T. FINN, L. J. GERARDI, JR., M. R. ROSS, AND W. P. SAUNDERS, JR. 1982. An evaluation of methods for assessing the effects of flow fluctuations on stream fish. 199 pp.

This study had three main components: (1) testing the applicability of the Instream Flow Incremental Methodology (IFIM) to an eastern river with daily fluctuating flows; (2) exploring some of the biological assumptions of the IFIM; and (3) developing new methods for studying fish behavior in streams with fluctuating flow. Two reaches of the Deerfield River in Massachusetts served as study sites.

82/64 DAMES AND MOORE. 1982. Inventory of toxic and hazardous waste disposal and discharge sites in the New Orleans and Houston areas: user's guide. 111 pp.

Maps of New Orleans and Houston with overlays accompany the text.

82/65 FRITTS, T. H., ET AL. 1983. Turtles, birds, and mammals in the northern Gulf of Mexico and nearby Atlantic waters. 455 pp.

Aerial line transect surveys of marine turtles, birds, and mammals were conducted in four areas of the Gulf of Mexico and nearby Atlantic waters. Data on distribution, abundance, seasonal occurrence, and habitat use are reported for each of the 88 species observed. Potential impacts of Outer Continental Shelf development are also discussed.

82/66 OLSEN, L. A. 1984. Effects of contaminated sediment on fish and wildlife: review and annotated bibliography. 103 pp.

A review and annotated bibliography of selected literature about the effects of contaminated sediment on the biota are presented. Pollution categories that are covered include heavy metals, hydrocarbons, synthetic organic compounds, and radionuclides.

82/67 [Not issued]

82/68 COSTANZA, R., ET AL. 1983. Ecological models of the Mississippi deltaic plain region: data collection and presentation. 342 pp.

This technical report consists of quantified ecosystem models with input-output matrices of the biology, hydrology, geology, and socioeconomics of the major habitats of the Mississippi deltaic plain region. The quantitative framework characterizes the region and provides a data base for future ecological models. Its companion document is *FWS/OBS*-82/69.

82/69 BAHR, L. M., JR., ET AL. 1983. Ecological characterization of the Mississippi deltaic

plain region: a narrative with management recommendations. 189 pp.

This narrative is designed to provide a general description of the Mississippi deltaic plain region, and is supplemented by detailed ecological data found in *FWS/OBS*-82/68. These two volumes are the final products of the Mississippi Deltaic Plain Region Characterization Study. (*See also* series abstract on p. 36.)

82/70 [Not issued]

82/71 [Not issued]

82/72 MITSCH, W. J., ET AL. 1983. Atlas of wetlands in the principal coal surface mining region of western Kentucky. 134 pp.

This reference document contains available information on the location and description of wetland areas of the region that will assist persons involved in surface mining, and other land-use activities, with planning and management of this valuable resource.

82/73 [Not issued]

82/74 OFFICE OF BIOLOGICAL SERVICES. 1982. Applications of coastal ecological characterizations: a summary of activities FY-79 through FY-82. 108 pp.

83/01 COPELAND, B. J., ET AL. 1983. The ecology of Albemarle Sound, North Carolina: an estuarine profile. 68 pp.

Biological characteristics of this large, oligohaline estuary are discussed in this report. Declining fisheries, algal blooms in freshwater tributaries, and changing patterns of land and water use are some of the issues discussed. This report outlines current management practices for Albemarle Sound, and provides a state-of-the-art information base and ecological synthesis of the estuary and its watershed.

83/02 AIKEN, J. D. 1983. Opportunities to protect instream flows in Nebraska and Kansas. 57 pp.

See series abstract under *FWS/OBS*-82/32.

83/03 KELLER, C. E., AND J. K. ADAMS, EDITORS. 1983. Proceedings of a workshop on cetaceans and sea turtles in the Gulf of Mexico: study planning for effects of Outer Continental Shelf development. 42 pp.

This publication presents keynote addresses and the results of working group sessions of a conference held 6–8 April 1982 at the University of Southern Mississippi in Long Beach. Impacts of Outer Continental Shelf development on cetaceans and sea turtles and mitigation options were the focus of the workshop.

83/04 ASH, A. N., ET AL. 1983. Natural and modified pocosins: literature synthesis and management options. 156 pp.

Pocosins are ecosystems endemic to the southeastern coastal plain of the United States. This document highlights some of the problems associated with altering pocosins to agriculture, forestry, and peat mining operation. Available literature has been synthesized, and resource management options for wildlife are described.

83/05 SIMENSTAD, C. A. 1983. The ecology of estuarine channels of the Pacific Northwest Coast: a community profile. 181 pp.

This report on the estuarine channel habitats of the Pacific Northwest is one of a series of community profiles that synthesize useful information about specific natural coastal habitats. The profile describes the geomorphological, hydrological, chemical, and biological components and natural processes of the channels, their energy interchange, and interactions among adjacent habitats.

83/06 [Not issued]

83/07 AIKEN, J. D. 1983. Opportunities to protect instream flows in Minnesota and Iowa. 64 pp.

See series abstract under *FWS/OBS*-82/32.

83/08 to 83/12 These handbooks contain information on the best current practices to minimize disturbances and adverse impacts of surface mining on fish and wildlife resources. Current State and Federal legislation was reviewed to determine those practices which were most compatible with the best technology currently available, fish and wildlife plans, and reclamation plans for specific regions of the U.S. The information presented includes risks, limitations, approximate costs, and maintenance and management requirements of each practice. Plans for the restoration of specific habitats are also included.

83/08 AMBROSE, R. E., C. R. HINKLE, AND C. R. WENZEL. 1983. Practices for protecting and enhancing fish and wildlife on coal surface-mined land in central and southern Appalachia. 208 pp.

83/09 PROCTOR, B. R., ET AL. 1983. Practices for protecting and enhancing fish and wildlife on coal surface-mined land in the Green River–Hams Fork Region. 242 pp.

83/10 PROCTOR, B. R., ET AL. 1983. Practices for protecting and enhancing fish and wildlife

on coal surface-mined land in the Powder River–Fort Union region. 246 pp.

83/11 AMBROSE, R. E., C. R. HINKLE, AND C. R. WENZEL. 1983. Practices for protecting and enhancing fish and wildlife on coal surface-mined land in the southcentral U.S. 229 pp.

83/12 PROCTOR, B. R., ET AL. 1983. Practices for protecting and enhancing fish and wildlife on coal mined land in the Uinta–Southwestern Utah region. 250 pp.

83/13 SKINNER, M. M., AND M. D. STONE. 1983. Identification of instream hazards to trout habitat quality in Wyoming. 69 pp.

Trout habitat quality can be affected by numerous physical, chemical, and biological features. Ten instream hazards, both natural and man caused, which may adversely affect trout habitat quality in western States were identified in this report. Color infrared aerial photography was used to identify specific hazards along reaches of several Wyoming rivers, and verified by on-site visits. Techniques for mitigating potential and existing hazards are presented.

83/14 and 83/15 These studies compile and synthesize existing information about the social and economic characteristics of the southwestern (*FWS/OBS*-83/14) and northwestern (*FWS/OBS*-83/15) coastal regions of Florida. This report, along with the data appendix, should prove useful for coastal planning and management. It is one in a series of coastal characterizations produced by the U.S. Fish and Wildlife Service.

83/14 FRENCH, C. O., AND J. W. PARSONS. 1983. Florida coastal ecological characterization: a socioeconomic study of the southwestern region.

Vol. I: Text, 333 pp.
Vol. II: Part 1, Data appendix 294 pp.
Vol. III: Part 2, Data appendix 359 pp.
Vol. IV: Part 3, Data appendix 196 pp.

83/15 FRENCH, C. O., AND J. W. PARSONS. Florida coastal ecological characterization: a socioeconomic study of the northwestern region.

Vol. I: Text, 306 pp.
Vol. II: Part 1, Data appendix. 309 pp.
Vol. III: Part 2, Data appendix. 375 pp.

83/16 RUDY, P., JR., AND L. H. RUDY. 1983. Oregon estuarine invertebrates: an illutrated guide to the common and important invertebrate animals. 226 pp.

This guide is intended for the biological field worker. Each invertebrate is fully illustrated and described. Other types of information include: possible misidentifications with similar species, ecological information, life history, and a representative bibliography.

83/17 ODUM, W. E., T. J. SMITH, III, J. K. HOOVER, AND C. C. MCIVOR. 1984. The ecology of tidal freshwater marshes of the United States East Coast: a community profile. 177 pp.

This is a compilation and synthesis of available data on the ecology of the tidal freshwater community. All structural and functional aspects of this distinctive estuarine ecosystem are discussed, including its geology, hydrology, biotic components, and energy, nutrient, and biomass cycling.

83/18 OLIVE, S. W. 1983. Protecting instream flows in Iowa: an administrative case study. 35 pp.

See series abstract under *FWS/OBS*-83/32.

83/19 BECCASIO, A. D., ET AL. 1983. Lower Mississippi Valley ecological inventory: user's guide and information base. 84 pp.

This study provides an inventory of important ecological resources along the lower Mississippi River, an area of some 126,200 km^2 (48,700 mi^2). This inventory is intended to provide government and industry decision-makers with valuable ecological information which will assist in the regional siting of oil and gas processing and manufacturing facilities and their respective transportation systems.

83/20 EHRLICH, T. 1983. Opportunities to protect instream flows in Georgia. 28 pp.

See series abstract under *FWS/OBS*-82/32.

83/21 WHITE, M. R. 1983. Opportunities to protect instream flows in Michigan and Wisconsin. 73 pp.

83/22 WHITE, M. R. 1983. Opportunities to protect instream flows in Texas, Oklahoma, and Arkansas. 94 pp.

See series abstract under *FWS/OBS*-82/32.

83/23 JOSSELYN, M. 1983. Ecology of the San Francisco Bay tidal marshes: a community profile. 102 pp.

This document compiles available published and unpublished scientific literature to describe the current status and ecology of the remaining tidal marshes in San Francisco Bay.

83/24 [Not issued]

83/25 HOBBIE, J. E. 1984. Ecology of tundra ponds of the Arctic coastal plain: a community profile. 52 pp.

This profile synthesizes data on the ecology of the thousands of small, shallow ponds that comprise an important wetland community on the tundra of the Arctic coastal plain of northern Alaska. The community is important for many species of migratory waterfowl and shorebirds that use the ponds for feeding and breeding. Effects of oil production activities in this area are a major issue facing managers of this wetland resource.

83/26 BOESCH, D. F., ET AL. 1983. Subsidence in coastal Louisiana: causes, rates, and effects on wetlands. 30 pp.

This report analyses current rates and causes, both natural and man-made, of ground subsidence in coastal areas of Louisiana. An accelerated subsidence rate has been observed. Much land loss is attributable to a relative lowering of wetland surface below the level adequate to support vegetation.

83/27 THOMAS, M. G. 1983. Human demograhic impacts on fish and wildlife resources from energy development in rural western areas. 357 pp.

This workbook provides a mechanism for analysis of human demographic impacts on fish and wildlife due to large-scale energy developments in Western States. It focuses on impacts related to land use conversions and the accompanying reduction in quantity or quality of habitat and on impacts related to population growth and their demands or impacts on fish and wildlife resources. The intended users are developers, resource managers, and planners. The workbook was designed for use with proposed coal or oil shale projects, but other energy development projects can be evaluated if projected work force requirements are known.

83/28 NELSON, R. W., W. J. LOGAN, AND E. C. WELLER. 1983. Playa wetlands and wildlife on the southern Great Plains: a characterization of habitat. 163 pp.

This characterization is a synthesis of knowledge about the habitat values of playa wetlands to migratory and resident wildlife. Variables which may affect the value of playa wildlife habitat included watershed size and the water surface area and depth; characteristics of vegetation; land use, particularly grazing and cultivation; and the extent of modification, particularly excavating and diking. The southern Great Plains playa wetland region encompasses parts of the Texas Panhandle, adjacent eastern New Mexico, the Oklahoma Panhandle, southwestern Kansas, and southeastern Colorado.

83/29 NELSON, R. W., W. J. LOGAN, AND E. C. WELLER. 1983. Playa wetlands and wildlife on the southern Great Plains: a guide to habitat management. 99 pp.

This report describes management techniques that can be implemented on playa wetlands of the southern Great Plains to make them more attractive to wildlife and fish. Most techniques can be implemented in conjunction with other farm and ranch operations. In fact, some techniques require the use of agricultural practices to accomplish management objectives. The report is aimed at the wildlife manager, the landowner, and the sportsman.

83/30 CLAPP, R. B., D. MORGAN-JACOBS, AND R. C. BANK. 1983. Marine birds of the southeastern United States and the Gulf of Mexico. Part III, Charadriiformes. 853 pp.

Information on the seasonal distribution and abundance of 22 species of marine birds of the order Charadriiformes that occur in the coastal southeastern United States has been compiled and mapped from the literature. This information was gathered in an attempt to assess the possible effects of offshore oil development on populations of marine birds in the Southeast.

83/31 CHAPMAN, B. R. 1984. Seasonal abundance and habitat use patterns of coastal bird populations on Padre and Mustang Island barrier beaches. 73 pp.

The report assesses the impact of the Ixtoc I oil spill on coastal bird populations and provides baseline information about the distribution and seasonal abundance of the avian species that use south Texas beach and nearshore habitats. The section on results and discussion describes the annual, seasonal, and daily cycles of avian abundance, distribution, and diversity. The species profiles sections provide distribution, status, seasonal abundance, habitat-use patterns, and oil vulnerability information for 26 species.

83/32 MCDONALD, C. B., A. N. ASH, AND E. S. KANE. 1983. Pocosins: a changing wetland resource. 22 pp.

This public-interest booklet describes pocosins and how they are changing. These freshwater wetlands are found on the Atlantic coastal plain from Virginia to Georgia, with approximately 70% in North Carolina in flat, upland areas. Modifications to make them more productive for agriculture, forestry, and other uses, and the effects of these modifications on fish, wildlife, and other natural resources in and around pocosins, are discussed.

83/33 ARMOUR, C. L., K. P. BURNHAM, AND W. S. PLATTS. 1983. Field methods and statistical analyses for monitoring small salmonid streams. 200 pp.

This publication contains information pertaining to monitoring programs which may be used to evaluate the effects of land use practices on small salmonid streams in the western United States. Information includes an approach for designing a monitoring program, variables which may be used with field measurement techniques, and statistical tests for evaluating data.

83/34 HUDY, M., AND R. W. GREGORY. 1984. Some limnological characteristics of eight limestone excavations in south Florida. 84 pp.

This study characterizes selected abiotic and biotic features of eight limestone excavation lakes in south Florida to help identify mitigation needs for future rock mining operations. Creation of additional littoral areas is one of several recommended mitigation techniques. An annotated bibliography of relevant references is also provided.

83/35 ARMBRUSTER, J. S., EDITOR. 1983. Impacts of coal surface mining on 25 migratory bird species of high Federal interest. 348 pp.

Potential impacts of coal surface mining on 25 migratory birds of high Federal interest are examined. Literature searches on each species have been used to develop individual species accounts. Information on species distribution, life history, habitat requirements, population status, effects of disturbance, and management techniques are included. Potential impacts from coal surface mining, recommendations for mitigation measures, and habitat reclamation suggestions are also presented.

83/36 DITTBERNER, P. L., AND M. R. OLSON. 1984. The Plant Information Network (PIN) database: Colorado, Montana, North Dakota, Utah, and Wyoming. 786 pp.

This publication provides introductory information on the Plant Information Network (PIN) and a print-out of PIN data. The PIN was a computerized data base containing information on native and naturalized vascular plants of five western States. Information was included on over 5,000 species found in Colorado, Montana, North Dakota, Utah, and Wyoming. Because of funding restrictions PIN is no longer operated as a computerized data base. This publication makes the PIN data available to resource managers, planners, and others who have a continuing need for this information.

84/01 SNYDER, B. D., AND J. L. SNYDER. 1984. Feasibility of using oil shale wastewater for waterfowl wetlands. 290 pp.

This study evaluated the use of selected wastewaters from oil shale development to establish wetland habitats for waterfowl. It also evaluated the capacity of the wetlands as an innovative wastewater treatment system. Minimum standards for water quality and quantity, and a comparison of the cost and effectiveness of wetland wastewater treatment vs. conventional treatment technologies were two of the study results.

84/02 THAYER, G. W., W. J. KENWORTHY, AND M. S. FONSECA. 1984. The ecology of eelgrass meadows of the Atlantic coast: a community profile. 147 pp.

This report, one of a series of community profiles produced by the Fish and Wildlife Service, synthesizes scientific literature and data on the eelgrass (*Zostera marina*) community of the Atlantic coast from North Carolina to Nova Scotia. It complements *FWS/OBS*-82/25 on the seagrasses of South Florida.

84/03 GREGORY, R. W., A. A. ELSER, AND T. LENHART. 1984. Utilization of surface coal mine wastewater for construction of a northern pike spawning/rearing marsh. 44 pp.

This report describes one example where wastewater from an energy development site (coal mine operation) was used to enhance the fisheries of an adjacent reservoir. The details of this report provide an example of what considerations may be necessary for similar projects; illustrate potential problem areas in the planning, construction, and operation of such a project; and stimulate ideas for developing other innovative uses of wastewater for fish and wildlife habitat enhancement.

84/04 WIEDEMANN, A. M. 1984. Ecology of Pacific Northwest coastal sand dunes: a community profile. 130 pp.

Dune habitats along the North American Pacific coast are assessed in this report. Plant communities and animal life are identified and linked to various dune forests, meadows, marshes and lakes. Impacts of urban development, off-road vehicle traffic, and the introduction and spread of European beachgrass (*Ammophila arenaria*) are discussed.

84/05 TAIT, H. D. 1984. National pollution discharge elimination system: guidelines for reviewing permits. 354 pp.

This handbook is designed primarily for use by Fish and Wildlife Service field office personnel in the review of NPDES section 402 permits. Emphasis is on providing access to information to be used in screening NPDES permits for relevance to fish and wildlife values. An annotated bibliography is included.

84/06, 84/07, and 84/14 These three volumes document the initial findings, survey design, findings, survey design, and survey protocol of the 1982 National Fisheries Survey. The survey was conducted to provide statistically valid data on the status of fish communities in the United States, and, as such, represents a baseline assessment of the biological quality of the Nation's waters.

84/06 JUDY, R. D., JR., P. N. SEELEY, T. M. MURRAY, S. C. SVIRSKY, M. R. WHITWORTH, AND L. S. ISCHINGER. 1984. 1982 National Fisheries Survey. Vol. I. Technical report, initial findings. 140 pp.

84/07 JUDY, R. D., JR., AND P. N. SEELEY. 1984. 1982 National Fisheries Survey. Vol. III, survey protocol. 43 pp.

84/08 OLIVE, S. W., AND B. L. LAMB. 1984. Conducting a FERC environmental assessment: a case study and recommendations from the Terror Lake project. 62 pp.

This publication discusses the negotiations surrounding the licensing of a hydroelectric power plant facility on Kodiak Island. The focus is on the interactions of the Federal Energy Regulatory Commission (FERC), the U.S. Fish and Wildlife Service, State agencies, and private interests. Recommendations and strategies for conducting successful negotiations of this kind are provided.

84/09 GOSSELINK, J. G. 1984. The ecology of delta marshes of coastal Louisiana: a community profile. 134 pp.

This document reviews and synthesizes ecological information and data on the extensive marshes of the Mississippi River deltaic plain. This area represents about 22% of the total coastal wetlands of the 48 conterminous United States. A complex mixture of human activities and natural processes has caused rapid degradation of this highly productive and valuable ecological community.

84/10 HOWARD, R., A. PERRY, AND P. HERRING. 1984. Endangered and threatened species on U.S. Air Force installations. 137 pp.

This report lists by State, Air Force Command, and taxonomic class, all endangered and threatened species that occur on U.S. Air Force installations. This information on species occurrence and habitat requirements is intended to aid the Air Force when planning activities, including maneuvers and construction projects, on its property.

84/11 ARMOUR, C. L., R. J. FISHER, AND J. W. TERRELL. 1984. Comparison of the use of the Habitat Evaluation Procedures (HEP) and the Instream Flow Incremental Methodology (IFIM) in aquatic analyses. 30 pp.

The Habitat Evaluation Procedures (HEP) are designed for quantifying habitat values and documenting impacts of habitat changes on fish and wildlife resources. The Instream Flow Incremental Methodology (IFIM) is specifically designed for simulating and quantifying impacts of changes in flow, channel morphology, or water quality on fish, invertebrates, and instream recreational activities. This paper contains information on the: (1) differentiating features and recommended uses of the two methods for environmental assessment; and (2) development and use of Suitability Index (SI) curves. The discussion is limited to consideration of the affects of habitat alterations on fish habitat.

84/12 SATHER, J. H., AND P. J. RUTA-STUBER, TECHNICAL COORDINATORS. 1984. Proceedings of the national wetland values assessment workshop. 100 pp.

This summarizes information resulting from the Wetland Values Assessment Workshop held in Alexandria, Virginia from May 23–25, 1983. Forty wetlands experts from 17 sponsoring agencies discussed wetland value assessment, focusing on the method for wetland functional assessment recently prepared for the Federal Highway Administration. The workshop resulted in the development of a National Wetlands Values Assessment Methodology which incorporates food chain, socioeconomic, hydrology, habitat, and water quality values of wetlands.

84/13 KELLER, C. E., J. A. SPENDELOW, AND R. D. GREER. 1984. Atlas of wading bird and seabird nesting colonies in coastal Louisiana, Mississippi, and Alabama: 1983. 127 pp.

Aerial surveys of waterbird colonies in coastal Louisiana, Mississippi, and Alabama conducted in 1983 were used to develop the maps presented in this report. The major objective of the survey was to provide up-to-date locations of active colony sites. The location, species composition, habitat, and an overall estimate of colony size were recorded for each of the 188 active colonies observed.

84/14 GLAUZ, W. D. 1984. National fisheries survey. Vol. II, survey design. 77 pp.

See abstract under *FWS/OBS*-84/05.

84/15 THEURER, F. D., K. A. VOOS, AND W. J. MILLER. 1984. Instream water temperature model. Instream Flow Information Paper 16. 321 pp.

This water temperature model is designed to predict instream water temperatures based on either historical or synthetic hydrological, meteorological, and stream geometry conditions. The model is applicable to any size watershed or river basin. It is divided into four sections: applications; physical processes and math models; user's manual; and software support documentation.

84/16 ROELLE, J. E., A. K. ANDREWS, G. T. AUBLE, D. B. HAMILTON, R. L. JOHNSON, AND J. F. SISLER. 1984. A framework for assessing the impacts of acidic deposition on forest and aquatic resources: results of a workshop for the National Acid Precipitation Assessment Program. 80 pp.

The National Acid Precipitation Assessment Program has planned a series of assessments to analyze the costs and benefits of various approaches to deal with the impacts of acidic deposition. The first of these assessments, to be completed in 1985, will focus on the extent of current damages (both physical and economic) due to acidic deposition. This report describes the results of a planning workshop, held in April 1983, whose purpose was to define the objectives of 1985 assessment with respect to forest and aquatic resources, and to achieve a common understanding among participants regarding alternative assessment approaches.

84/17 LEE, J. E., AND J. M. WALSH. 1984. Map projections for use with the Geographic Information System. 60 pp.

This document has been prepared to assist users of the Geographic Information System (GIS) in understanding and using the various map projections which are available. Currently, 20 map projections may be used in the GIS.

84/18 SATHER, J. H., AND R. D. SMITH. 1984. An overview of major wetland functions and values. 75 pp.

This report was prepared to provide background information for participants at the National Wetland Values Assessment Workshop held at Alexandria, Virginia, in May 1983. Workshop proceedings have been published as: Sather, J. Henry, and Patricia J. Ruta Stuber. 1984. Proceedings of the National Wetland Assessment Workshop. *FWS/OBS*-84/12. 100 pp.

84/19 ROCHESTER, H., JR., T. LLOYD, AND M. FARR. 1984. Physical impacts of small-scale hydroelectric facilities and their effects on fish and wildlife. 191 pp.

This manual provides an introduction to small-scale hydroelectric (<30 MW) technology, and its impacts on fish and wildlife and their habitats, for fisheries or wildlife biologists or other nonengineer readers. The text emphasizes the technical aspects of small-scale hydro, with a very limited discussion of institutional social, legal, and economic factors.

84/20 ENGBRING, J., AND F. L. RAMSEY. 1984. Distribution and abundance of the forest birds of Guam: results of a 1981 survey. 54 pp.

This survey represents the first systematic and comprehensive effort to obtain baseline data on the distribution and abundance of Guam's avifauna. The results of the 1981 survey and historical record document the advanced state of the decline in avian distribution, densities, and population sizes, and are used to identify the key remaining habitats for Guam's native birds. Possible causes of the decline, such as disease, introduced predators, pesticides, and habitat loss, are discussed and recommendations for future studies are made.

84/21 [Not issued]

84/22 [Not issued]

84/23 [Not issued]

84/24 PHILLIPS, R. C. 1984. Ecology of eelgrass meadows in the Pacific Northwest: a community profile. 85 pp.

This document synthesizes the extent literature pertinent to the ecology of eelgrass (*Zostera marina*) beds of the Pacific Northwest: that part of the coast extending from Cape Flattery, Washington, to Cape Mendocino, California. This report describes the physiographic setting of the eelgrass community, the distribution of the grass beds, autecology of the eelgrass in terms of growth and reproductive strategies and physiologic requirements and functions. The ecological and functional attributes of the eelgrass system or community are also described.

Appendixes

Appendix A

Research and Development Facilities[1]

Wildlife Research Facilities

National Wildlife Health Laboratory
6006 Schroeder Road
Madison, WI 53711

Northern Prairie Wildlife Research Center
P.O. Box 2096
Jamestown, ND 58402

Patuxent Wildlife Research Center
Laurel, MD 20708

Denver Wildlife Research Center
Federal Center, Building 16
Denver, CO 80225

Fishery Research Facilities

Columbia National Fishery Research Laboratory
Route 1
Columbia, MO 65201

Great Lakes Fishery Laboratory
1451 Green Road
Ann Arbor, MI 48105

National Fisheries Center–Leetown
Box 700
Kearneysville, WV 25430

National Fisheries Research Laboratory
P.O. Box 818
LaCrosse, WI 54601

Seattle National Fishery Research Center
Building 204, Naval Station
Seattle, WA 98115

National Teams

Eastern Energy and Land Use Team
Box 705
Kearneysville, WV 25430

National Coastal Ecosystems Team
1010 Gause Boulevard
Slidell, LA 70458

Western Energy and Land Use Team
Drake Creekside One
2627 Redwing Road
Fort Collins, CO 80526-2899

Cooperative Research Units

Alabama Cooperative Fishery and Wildlife Research Unit
331 Funchess Hall
Auburn University
Auburn, AL 36849

Alaska Cooperative Wildlife Research Unit
209 Irving Building, UAF
902 Koyukuk Avenue North, UAF
Fairbanks, AK 99775

Alaska Cooperative Fishery Research Unit
U.A.F., 138 Arctic Health Research Building
University of Alaska
901 Koyukuk Avenue South
Fairbanks, AK 99701

Arizona Cooperative Wildlife Research Unit
214 Biological Sciences East
University of Arizona
Tucson, AZ 85721

Arizona Cooperative Fishery Research Unit
210 Biological Sciences East
University of Arizona
Tucson, AZ 85721

California Cooperative Fishery Research Unit
Humboldt State University
Arcata, CA 95521

Colorado Cooperative Fish and Wildlife Research Unit
Room 201, J.V.K. Wagar Building
Colorado State University
Fort Collins, CO 80523

[1]Facility names as of December 1985. (For current names see page 6.)

Florida Cooperative Fish and Wildlife Research Unit
117 Newins-Ziegler Hall
University of Florida
Gainesville, FL 32611

Georgia Cooperative Fish and Wildlife Research Unit
School of Forest Resources
University of Georgia
Athens, GA 30602

Grambling Cooperative Wildlife Project
Department of Biological Sciences
Box 815
Grambling State University
Grambling, LA 71245

Hawaii Cooperative Fishery Research Unit
2538 The Mall
University of Hawaii
Honolulu, HI 96822

Idaho Cooperative Fish and Wildlife Research Unit
College of Forestry, Wildlife, and Range Sciences
University of Idaho
Moscow, ID 83843

Iowa Cooperative Fish and Wildlife Research Unit
Science Hall II
Iowa State University
Ames, IA 50011

Louisiana Cooperative Wildlife Research Unit
School of Forestry and Wildlife Management
Louisiana State University
Baton Rouge, LA 70803

Louisiana Cooperative Fishery Research Unit
Room 405, Agricultural Center
Louisiana State University
Baton Rouge, LA 70803

Maine Cooperative Fish and Wildlife Research Unit
240 Nutting Hall
University of Maine
Orono, ME 04469

Massachusetts Cooperative Fish and Wildlife Research Unit
204 Holdsworth Hall
University of Massachusetts
Amherst, MA 01003

Mississippi Cooperative Fish and Wildlife Research Unit
Dorman Hall, Box BX
Mississippi State University
Mississippi State, MS 39762

Missouri Cooperative Fish and Wildlife Research Unit
112 Stephens Hall
University of Missouri
Columbia, MO 65201

Montana Cooperative Wildlife Research Unit
107 Health Sciences
University of Montana
Missoula, MT 59812

Montana Cooperative Fishery Research Unit
Biology Department
Montana State University
Bozeman, MT 59717

New York Cooperative Fish and Wildlife Research Unit
Fernow Hall
Cornell University
Ithaca, NY 14853

North Carolina Cooperative Fishery Research Unit
Department of Zoology
Box 7617, Room 4105, Gardner Hall
Raleigh, NC 27695

Ohio Cooperative Wildlife Research Unit
1735 Neil Avenue, Department of Zoology
Ohio State University
Columbus, OH 43210

Ohio Cooperative Fishery Research Unit
1735 Neil Avenue, Department of Zoology
Ohio State University
Columbus, OH 43210

Oklahoma Cooperative Fish and Wildlife Research Unit
Room 433, Life Sciences West Building
Oklahoma State University
Stillwater, OK 74078

Oregon Cooperative Wildlife Research Unit
104 Nash Hall
Oregon State University
Corvallis, OR 97331

Oregon Cooperative Fishery Research Unit
Department of Fisheries and Wildlife
104 Nash Hall
Oregon State University
Corvallis, OR 97331

Pennsylvania Cooperative Fish and Wildlife Research Unit
113 Ferguson Building
Pennsylvania State University
University Park, PA 16802

Pine Bluff Cooperative Fishery Project
Department of Agriculture
Box 108
University of Arkansas at Pine Bluff
Pine Bluff, AR 71601

South Dakota Cooperative Fish and Wildlife Research Unit
Department of Wildlife and Fishery Sciences
South Dakota State University
Brookings, SD 57007

Tennessee Cooperative Fishery Research Unit
Box 5063, Biology Department
Tennessee Technical University
Cookeville, TN 38505

Utah Cooperative Fish and Wildlife Research Unit
Department of Wildlife and Fishery Science
Utah State University
Logan, UT 84322

Virginia Cooperative Fish and Wildlife Research Unit
106 Cheatham Hall
Virginia Polytechnic Institute and State University
Blacksburg, VA 24601

Washington Cooperative Fishery Research Unit
College of Fisheries WH-10
University of Washington
Seattle, WA 98195

Wisconsin Cooperative Wildlife Research Unit
226 Russell Laboratories
University of Wisconsin
Madison, WI 53706

Wisconsin Cooperative Fishery Research Unit
College of Natural Resources
University of Wisconsin
Stevens Point, WI 54481

Wyoming Cooperative Fish and Wildlife Research Unit
Box 3166 University Station
University of Wyoming
Laramie, WY 82701

Appendix B

Federal Government Regional Depository Libraries

Federal depository libraries assume the responsibility of retaining depository material permanently and of providing inter-library loan and references serviced in the region served.

Federal Government regional depository libraries are listed by State, as of June 1984:

Alabama

Montgomery Library
Documents Department
Auburn University
Montgomery, AL 36193

Library
University of Alabama
Reference Department/Documents
Box S
University, AL 35486

Arizona

Department of Library Archives and Public Records
Third Floor State Capitol
1700 West Washington
Phoenix, AZ 85721

Arkansas

Arkansas State Library
Documents Service Section
One Capitol Mall
Little Rock, AR 72201

California

California State Library
Government Publications Service
914 Capital Mall
Sacramento, CA 95814

Colorado

Norlin Library
University of Colorado at Boulder
Government Publications
Campus Box 184
Boulder, CO 80309

Denver Public Library
Government Publication Department
1357 Broadway
Denver, CO 80203

Connecticut

Connecticut State Library
231 Capitol
Hartford, CT 06106

Florida

Libraries
University of Florida
Documents Department
Library West
Gainesville, FL 32611

Georgia

Libraries
University of Georgia
Government Documents Department
Athens, GA 20602

Hawaii

Hamilton Library
University of Hawaii
Government Documents Collection
2550 The Mall
Honolulu, HI 96822

Idaho

University of Idaho Library
Documents Section
Moscow, ID 83843

Illinois

Illinois State Library
Government Documents
Centennial Building
Springfield, IL 62756

Indiana

Indiana State Library
Serials Section
140 North Senate Avenue
Indianapolis, IN 46204

Iowa

Library
University of Iowa
Government Publications Department
Iowa City, IA 52242

Kansas

University of Kansas
Spencer Research Library
Documents Collection
Lawrence, KS 66045

Kentucky

University of Kentucky Libraries
Government Publications Department
Lexington, KY 40506

Louisiana

Louisiana State University
Middleton Library
Government Documents Department
Baton Rouge, LA 70803

Louisiana Technical University
Prescott Memorial Library
Documents Department
Ruston, LA 71272

Maine

University of Maine
Raymond H. Fogler Library
Tri-State Regional Documents Depository
Orono, ME 04469

Maryland

University of Maryland
McKledin Library
Documents Division
College Park, MD 20742

Massachusetts

Boston Public Library
Documents Receipts
Boston, MA 02117

Michigan

Detroit Public Library
5201 Woodward Avenue
Detroit, MI 48202

Library of Michigan
Government Documents
P.O. Box 30007
735 E. Michigan Avenue
Lansing, MI 48909

Minnesota

University of Minnesota
Wilson Library
Government Publications
309 Nineteenth Avenue South
Minneapolis, MN 55455

Mississippi

University of Mississippi
J.D. Williams Library
Documents Department
University, MS 38677

Montana

University of Montana
Maureen and Mike Mansfield Library
Documents Division
Missoula, MT 59812

Nebraska

Nebraska Library Commission
Federal Documents Department
1420 P Street
Lincoln, NE 68508

Nevada

University of Nevada–Reno
Library
Government Publications Department
Reno, NV 89557

New Jersey

Newark Public Library
U.S. Documents Division
5 Washington Street
P.O. Box 630
Newark, NJ 07101

New Mexico

University of New Mexico
General Library
Government Publications & Maps Department
Albuquerque, NM 87131

New Mexico State Library
325 Don Casper Avenue
Santa Fe, NM 87501

New York

New York State Library
Documents Control
6th Floor, Cultural Education Center
Empire State Plaza
Albany, NY 12230

North Carolina

University of North Carolina at Chapel Hill
Wilson Library
BA/SS Division Documents
Chapel Hill, NC 27514

North Dakota

North Dakota State University Library
Government Documents Department
Fargo, ND 58105

Ohio

State Library of Ohio
Documents Section
65 South Front Street
Columbus, OH 43215

Oklahoma

Oklahoma Department of Libraries
Government Documents
200 NE 18th Street
Oklahoma City, OK 73105

Oklahoma State University Library
Documents Department
Stillwater, OK 74078

Oregon

Portland State University Library
P.O. Box 1151
Portland, OR 92707

Pennsylvania

State Library of Pennsylvania
Government Publications Section
Box 1601
Walnut Street & Commonwealth Avenue
Harrisburg, PA 17105

Texas

Texas State Library
Public Services Department
P.O. Box 12927
1201 Brazon
Austin, TX 78711

Texas Tech University Library
Documents Department
Lubbock, TX 79409

Utah

Utah State University
Merrill Library and Learning Resources Center
UMC-30
Documents Department
Logan, UT 84322

Virginia

University of Virginia
Alderman Library
Government Documents
Charlottesville, VA 22901

Washington

Washington State Library
Documents Section
Olympia, WA 98504

West Virginia

West Virginia University Library
Government Documents Section
P.O. Box 6069
Morgantown, WV 26506

Wisconsin

State Historical Society of Wisconsin Library
Government Publications Section
815 State Street
Madison, WI 53706

Milwaukee Public Library
Documents Division
814 West Wisconsin Avenue
Milwaukee, WI 53233

Wyoming

Wyoming State Library
Supreme Court and Library Building
Cheyenne, WY 82002

Cortese, Thomas J., and Barbara A. Groshek, compilers. 1987. **Selected publication series of the U.S. Fish and Wildlife Service, 1889–1985.** U.S. Fish Wildl. Serv., Resour. Publ. 159. 163 pp.

This annotated bibliography provides a detailed record of 10 selected Research and Development series publications produced by the U.S. Fish and Wildlife Service and its predecessor agencies in the Department of Interior and the Department of Agriculture. The author, species, and subject indexes are provided under a separate cover. The bibliography reflects the changing emphases in fish and wildlife research since 1889—from husbandry and predator control to sophisticated applications of new technologies.

Key words: Annotated bibliography, *North American Fauna, Wildlife Research Report, Special Scientific Report—Wildlife, Technical Paper, Resource Publication, Wildlife Leaflet, Fish Disease Leaflet, Investigations in Fish Control, FWS/OBS.*

Cortese, Thomas J., and Barbara A. Groshek, compilers. 1987. **Selected publication series of the U.S. Fish and Wildlife Service, 1889–1985.** U.S. Fish Wildl. Serv., Resour. Publ. 159. 163 pp.

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Key words: Annotated bibliography, *North American Fauna, Wildlife Research Report, Special Scientific Report—Wildlife, Technical Paper, Resource Publication, Wildlife Leaflet, Fish Disease Leaflet, Investigations in Fish Control, FWS/OBS.*

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